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ABSTRACT

Presented are environmental education lessons adapted for use in the junior high schools of Pinellas County, Florida. This manual is organized according to six conceptual schemes: interrelationships, heredity and environment, change, effects of population growth, finite resources, and environmental responsibility. Outlines of related activities follow a discussion of each scheme. In many instances, these learning experiences illustrate concepts with examples of local environmental concerns. (WB)

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ENVIRONMENTAL EDUCATION
INTERDISCIPLINARY CONCEPTS AND ACTIVITIES GUIDE

GRADE 8

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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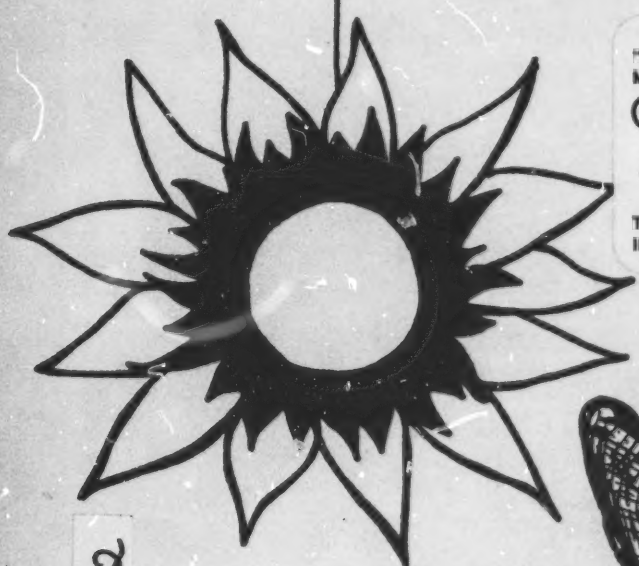

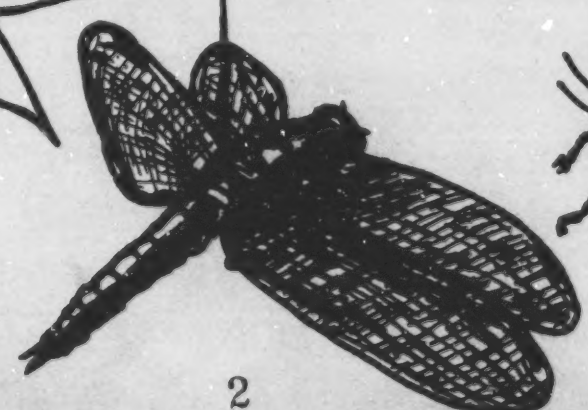

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The School Board of Pinellas County

Gus Sakkis, Superintendent

ENVIRONMENTAL EDUCATION

INTERDISCIPLINARY CONCEPTS and ACTIVITIES

GUIDE - GRADE 8

This publication is one of a series of interdisciplinary environmental activity guides made available for the Middle Schools of Pinellas County. The original of this publication serves as the teaching nucleus for Environmental Education activities in Grade eight in Lee County, Florida. The development of the program was a joint effort of the teachers, students and staff of the Lee County Schools under the supervision, and in cooperation with the Lee County Environmental Education Center. The publication has been modified to facilitate its use in the schools of Pinellas County.

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INTRODUCTION

Pinellas County has experienced a tremendous influx of permanent residents over the past few years. It is beginning to experience many of the problems associated with a high density population contained within a limited geographical area. The environment of Pinellas County, which has provided an abundancy of clean water, air, greenery, and sun, has been a major attraction for the young and old, the working people, and many of the retired. It is these very things, however, which are being strained by the demands of a steadily increasing population.

Within the last few years, problems have arisen in providing enough fresh potable water, effective waste disposal and sewage treatment, electric power, fuel oil, gasoline, other energy sources, recreational areas, and other such services and supplies which people need. Air and water pollution, once completely foreign to the county, are now becoming increasingly evident. Long term residents give testimony to the rapidly declining quality of the environment. They are complaining, and rightfully so, that the quality of the environment which attracted them to settle here has been adversely affected.

If the present growth-use trends are permitted to continue for too many years, Pinellas County will, indeed, find itself in severe trouble. Not only will it become increasingly difficult to maintain the services which people expect and demand, but it will also be highly improbable that the deterioration of the environment will be slowed or reversed. There may come a time, in the not too distant future, when Pinellas County will

not be an attractive place, either to live, or visit. When this occurs, one of the major economic bases of this county, that of tourism, will be reduced drastically. This, most certainly, will result in an even further decline in the ability of the county to maintain services and support.

The energy crisis has recently become one of the foremost problems in Pinellas County. This has been particularly felt in a county where over 80% of the residents depend on their automobiles for transportation to and from work. It is now apparent that the need for an efficient mass transportation system is immediate, but such a system is slow in coming. The availability of electrical power is now just barely ahead of the demand. If the demand continues to increase at its present rate, it will soon exceed the available supply, and yet another energy crisis will be experienced in Pinellas County. Alternate plans of energy supply have not yet been exploited. Solar energy could represent one of the best alternatives for Pinellas County, and most of Florida.

There is no easy or simple answer to the environmental problems of Pinellas County due to the complexity of the causative agents. One of the answers lies in effective city and county planning and management. This, however, depends to a large extent on educated and responsive citizenry. Unless the residents who consider Pinellas County their permanent home become aware of the long range cause and effect aspects of county management and growth potential, and the combined effects on the environment, little will be done to

protect their interests. In the past, it has been the case of too little and too late.

The educational system of Pinellas County can provide an opportunity for the citizens that it serves to become familiar with the environment in which they live and in the important part that it plays in their lives. Through a good comprehensive program, the citizens may not only become aware of the problems and the alternatives, but they may also advance to actually helping with the solutions to some of the problems.

Today's students are going to face an ever-increasing burden of environmental choices. Many of these choices are not going to be easy. The students will require a good foundation in several discipline areas as the solutions to environmental problems usually encompass the total spectrum of human thought and activity. Determination of the level of pollution in a waterway is only the first step toward the solution of a problem. Correcting the degradation of the waterway will require input from politicians, scientists, businessmen, communication experts, frequently artists, and always the general public. Attaining environmental quality is everyone's responsibility, and, as such, is going to require knowledge on the part of all our citizens. If your students are to make intelligent choices they will feel comfortable living with, they are going to need you to provide them with much of the background information they will need. Our environmental problems demand our attention in every phase

of the curriculum so that our students can be prepared to solve this enigma.

Predicting the experiences and knowledge students will need in the future is always a difficult task. However, a few basics are readily identifiable. It seems logical to assume that a person cannot make intelligent decisions if he is not aware of the problem, or even the existence of the area that has the problem. Next, it is important that he understands or has some basic knowledge about the stressed area and the stress factors involved. Finally, once an individual is aware of a problem and has knowledge about it, he must have the tools to effect a solution for the problem. Thus, awareness of the environment, knowledge of the environment and action in the sense of effecting a solution are three themes in educating a student to prepare him for environmental choices.

You will notice that each of the concepts is placed into one of six fundamental conceptual schemes. Those conceptual schemes are listed before each section along with a brief explanation of their meaning.

Notice, as you look through the guide, that the conceptual schemes are divided into sections with a conceptual scheme and a full page picture to mark the beginning of each section. The pictures have been drawn to illustrate and further define the conceptual scheme. Note that every concept is also illustrated.

The activities following each concept are meant to be stimulators and frequently are not written in detail. Use the activities as idea suggestions and points of departure for further work relating to that concept.

Some of the activities refer to Matthew Brennan's Series entitled People and Their Environment. You should obtain a copy of these guides, if at all possible.

Hopefully, you will have an opportunity to cover each concept with at least one activity and, in this way, the student will have the whole package at the end of the school year. The guide was not written with the intent that you use every activity, but rather to give you a choice of activities for each concept. Since the guide itself is not sequenced, you do not have to do the first activities before you do the last. Feel free to enter the guide on any page and begin working. The intention is not to make these activities a separate environmental education program, but rather to blend them into your daily reading, arithmetic and writing activities.

CONCEPTUAL SCHEME I

All living things including man are interrelated and, therefore, are also interdependent.

many INSECTS are essential to man's SURVIVAL
PHYTOPLANKTON produces 70% of Earth's OXYGEN supply
PLANKTON
MANGROVES & SEA GRASS provides food base for marine food chains
most PESTS are controlled by natural checks
SUN
ALL MAN'S FOOD depends on the SUN and living things

This concept is probably the most difficult idea for modern man to comprehend. Technology has removed modern man from his daily contact with the sun, land, plants, animals, and his concrete realization that he depends on them for survival.

When is the last time you thought of the insect that pollinated the orange blossom that enabled you to drink orange juice, or the plant that provided the food and oxygen for the cow that provided milk or hamburger for you?

The interrelationships man has with other living things is an all encompassing, interdependent web upon which the survival of all living things depend.

CONCEPTUAL SCHEME I

All living things, including man, are interrelated and, therefore, are also interdependent.

The interrelationship of all living things to one another has been a basic assumption derived from the biological study of genetics, evolution and social behavior since man began to write down his observations in the form of recorded history.

Biologists can show, too, that living things are not just interrelated, but they are also interdependent.

An analogy might be seen in the web of the fisherman's net. Each mesh is interrelated to those about it and dependent upon others for the support and strength necessary for efficient use in catching fish. If meshes are cut or broken, their loss fails not only themselves, but those that surround them. A point is finally reached when too many meshes are broken and the net can no longer serve its function of catching fish.

So it is in the ecosystem, the system of life, when too many species become extinct, or too many forests, marshes or mangroves are removed, or too much pollution is produced, hindering the living links, the ecosystem is made less efficient or stable, and ultimately runs the risk of breaking down. Remember, man is only one of the meshes in the net, and, while he has the ability to do some repair work, he alone cannot control the workings of the net.

Concept A

Estuarine food webs in South Florida are dependent on mangroves -- (case study).

See also Conceptual Scheme V, Concept B and Conceptual Scheme III, Concept B.

Activity 1

Have the students thoroughly study a mangrove system. The following questions will help guide them:

--What goes into the system in terms of energy and nutrients? (Energy from the sun and run-off from the land adds nutrients.)

--What comes out? (Organic molecules that can be used for food by other organisms.)

--What does man harvest from the mangrove system? (Fish, shrimp, crabs, etc.)

--What animals and plants depend on the mangrove system? (Fish, crustaceans, birds, mammals, many species of algae, uncounted species of microscopic organisms, etc.)

--How productive is the mangrove system compared to a residential section? (Many-fold more productive.) To cattle grazing land? (Mangroves are more productive.) To crop growing land? (Mangroves are more productive than most crops.)

--How does man destroy the mangrove system? (Dredge and fill and crowding it with his developments and their wastes.)

--How long will it take man to restore the mangrove system when he has completely destroyed it? (Not possible to completely restore it.)

--How much is an acre of mangrove in its natural state worth? ($35,000 per acre per year.) How much is it worth when it is sold? (Approximately $20,000.)

--What kind of laws do we have to protect the mangroves? (Bulkhead lines, but none of any real worth.)

--How do mangroves protect us during a hurricane? (Their densely intertwined roots and branches break up the force of the wind and waves and slow the storm tide.)

--What will Florida be like without mangroves?

--What happens to the land when mangroves are removed? (The land becomes subject to erosion.)

Activity 2

Take a field trip to a Mangrove area, if possible. See the Environment Guide: The City, On Campus, Off Campus & Ecology Treasure Hunts for further information.

Activity 3

Students should prepare a class report on the ecology of an estuary, which will illustrate what is being sacrificed in terms of plant and animal life in return for residential and industrial developments.

--What is an estuary?

--Why is an estuary so important to the development of many organisms?

--What can be done to prevent or limit building in these areas?

--What are the rights of individuals or corporations to whom these areas belong?

--Do these people have the responsibility to consider the effects of their ventures on the environment? How should they express this responsibility?

--How do we choose which wetlands to preserve and which to develop in response to the needs of an expanding population? List specific criteria that should be used in making a determination.

Activity 4

Show the film, "The Birth of a Florida Key," Pinellas County #917-2-017., available from the Media Center. Relate this to the concept through a discussion.

Activity 5

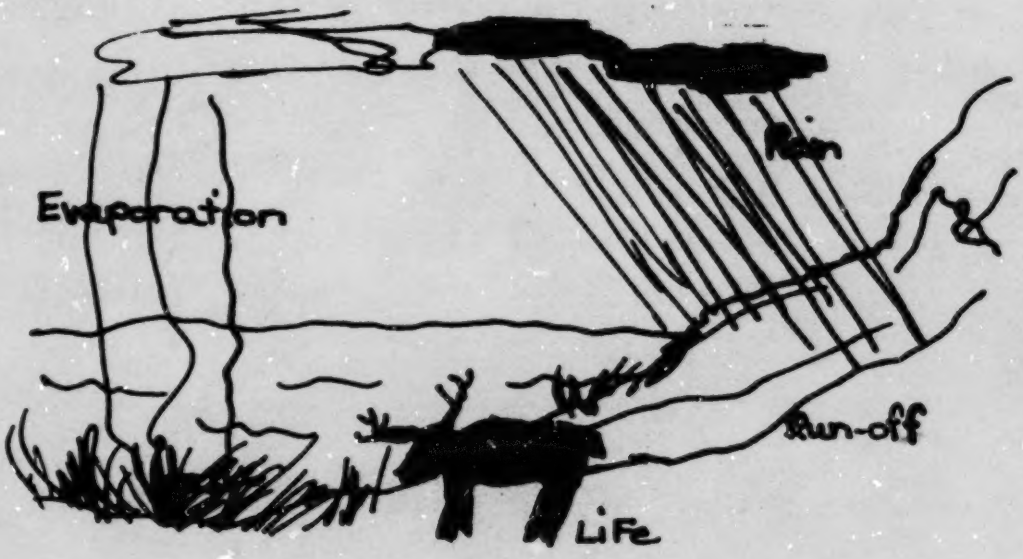
Show the film, "Nature's Half Acre," Pinellas County #591-2-017.

Activity 6

Show the film, "Salt Marsh," Pinellas County #574-2-051.

Concept B

In nature, all basic matter is cyclic although some cycles take longer than others. Cycles important to living organisms include the water, carbon, nitrogen, and oxygen cycles.



Activity 1

Water Cycle.

Use Lesson 1, "Water For Life", Brennan's People and Their Environment, Biology, p. 5 and Lesson 7, "The Water Cycle", Brennan's People and Their Environment, Grades 4-5-6, p. 17.

Show the film, "Water Cycle," Pinellas County #551-1-009.

Show the film, "Water Coming and Going," Pinellas County #551-2-031.

Activity 2

Oxygen Cycle

Use Lesson 4, "Oxygen Cycle", Brennan's People and Their Environment, Biology, p. 16.

Activity 3

Carbon Cycle.

Use the following activities from Brennan's People and Their Environment, Biology, and relate them to the concept:

Lesson 6, "Energy for Life", p. 21

Lesson 7, "Plant-Animal Relationships", p. 23

Lesson 8, "Producer Consumer Relationships", p. 25

Lesson 10, "Food Webs", p. 28

Lesson 14, "Decay Organisms", p. 35

Show the film, "Food From the Sun," Pinellas County #523-1-007.

Activity 4

Nitrogen Cycle.

Use Lesson 5, "Nitrogen Cycle", Brennan's People and Their Environment, Biology, p. 19.

Activity 5

Take 2 stoppered test tubes, each one half full of a Brom thymol blue solution. Bubble your breath through a straw into each tube until the Brom thymol blue turns yellow. Leave one tube stoppered as a control, and place a green water plant in the second tube. Stopper the tube, and place both tubes in the sunlight.

--After about 5 to 10 minutes - Is anything happening?

--Where are the bubbles coming from?

--Of what are these bubbles made?

--After about 30 to 40 minutes - What is happening to the Brom thymol blue?

--What is this process called?

--Does this process occur in nature?

--What would happen if most green plants were to be eliminated from the earth? Describe the resulting environment.

Activity 6

Since the supply of matter is finite, the continuation of life depends upon a cyclic flow of materials between organisms and their environment. Have students learn the details of a major biogeochemical cycle (carbon, nitrogen, oxygen, or water). When they are familiar with the principal details and processes of the cycle, describe how an atom circulates through the environment.

--Why is life dependent upon the circulation of materials from one form to another throughout the environment?

--What predictions would you make if the flow of material in one of these cycles were slowed down? Suppose the cycle were stopped completely?

--What is the effect of an expanding human population on these cycles?

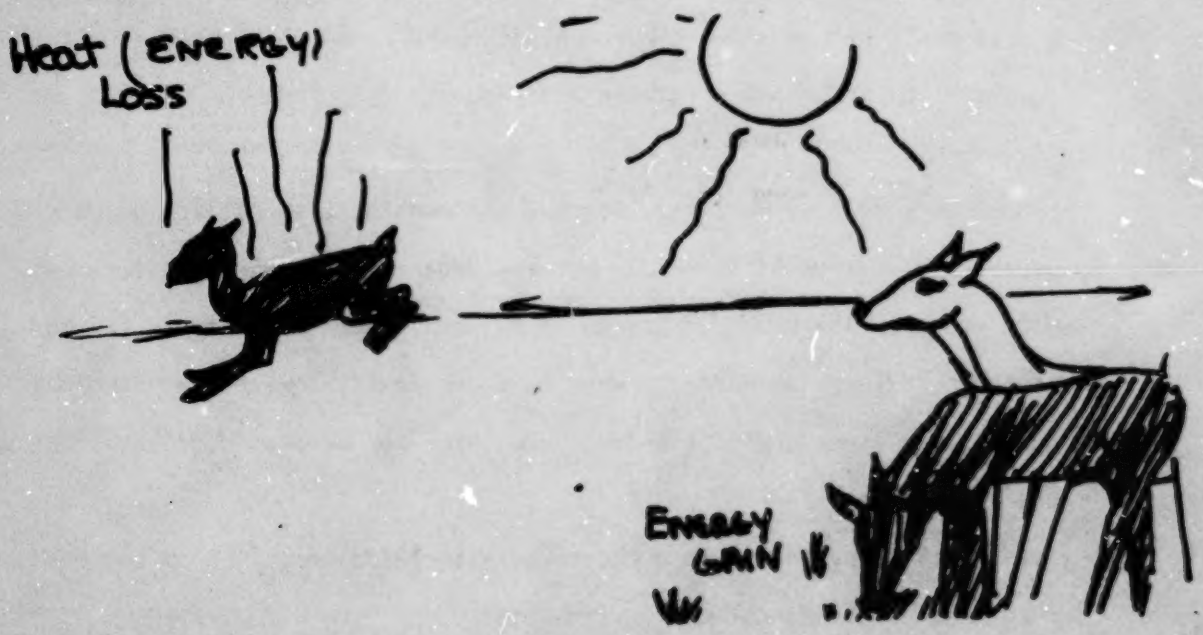
--How may these cycles affect the expanding human population?

--What can be done to improve recycling in order to meet the problems of an expanding population?

--What does this information suggest about the kinds of things we currently produce?

Concept C

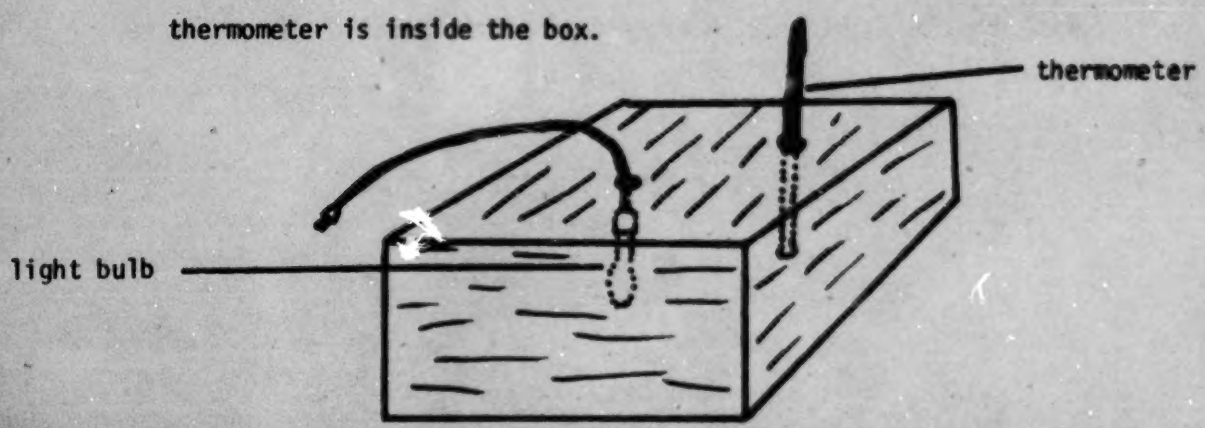
In living systems, energy is constantly lost as heat, and the lost energy is replaced by energy from the sun through the photosynthetic activity of plants.



See also Conceptual Scheme V, Concept C.

Activity 1

Do you know your body produces as much heat as a 100 watt light bulb? Obtain a small cardboard box and carefully hang a 100 watt light bulb inside the box. Be careful to keep the bulb from touching the cardboard. Insert a thermometer through the cardboard so that the bulb of the thermometer is inside the box.



Turn the bulb on and have your students record the temperature change every 2 minutes for about 20 minutes. As a math exercise, have your students graph this data.

--Was the temperature leveling off at the end of 20 minutes? Would it get much hotter inside the box?

--Why was the temperature in the box rising? (In converting electrical energy to light energy a great deal of energy is lost as heat.)

--When your body converts food (chemical energy) in to physical energy, as when you do work, is any energy lost? (Yes. As with the light bulb a great deal of the energy is lost as heat and so when you work hard, you begin to feel very warm.)

--Have you ever felt the temperature rise in a room full of people? (Of course, this is why we prechill a room with an airconditioner before a large group meeting is held.)

--Do you think other animals produce heat this way? (Yes, all animals produce heat. You can have the students prove this by placing several insects in a small flask and placing a thermometer in a one-hole stopper. Then stopper the vessel. Insulate the outside of the flask with the best material you have available.)

--Do you think plants produce heat? (Yes, all living material produce heat.)

--Is the heat recycled through the energy system? (No, living organisms do not use heat as an energy source.)

--If energy is not recycled, where does the new energy to keep the system going come from? (Plants convert light energy into chemical energy through the process of photosynthesis. Without this basic conversion, all living forms would soon run out of energy, since living systems are not 100% efficient.)

Activity 2

Construct an energy pyramid. Show the movement of energy from one trophic level to another. Emphasize that the producers obtain their energy from the sun and all consumers obtain their energy from producers. Point out that, as energy is transferred from one trophic level to the next, much is lost to the atmosphere in the form of heat.

--List the food products associated with the different levels of the energy pyramid.

--Is most of our food obtained from the upper or the lower portion of the pyramid? Account for this.

--In order to make more efficient use of the energy available, what part of the food pyramid must be exploited?

--If the world population continues to increase alarmingly, what parts of the energy pyramid might become unavailable? Why?

Activity 3

Have students select a local commercial area and determine the amount of energy used (e.g. automobile, manufacturing, air conditioning).

a. Number of gallons of fuel oil needed to run an airconditioner for one hour.
b. Energy consumed by appliances.
c. Solar energy - falling on a given area of grass. How much energy does a cow get from this amount of grass?
d. Light energy (Amount of energy needed for electricity).

--Where does all of the energy come from?

Activity 4

Relate electrical energy to this cycle and relate it to its dependence on the sun's energy.

Show the film, "Electricity, How it is Generated," Pinellas County #621-1-004.

Activity 5

Show the film, "Solar Energy," Pinellas County #531-2-018.

Concept D

The demand for space for some animal species is an inherited behavior pattern which often causes space to become a limiting factor in any ecosystem (territoriality).

Activity 1

Probably one of the most immediately responsive shows of territoriality might be shown by holding a mirror to a Betta splendens (Siamese fighting fish available from aquarium shops) tank and observing the fish's reaction to the "outsider." Most students will be impressed with this behavior, but few will be able to relate this activity to humans without careful transfer leads from the teacher.

--Why do the male Betta fish fight? (To guard a territory probably for breeding functions.)

--Does this fighting benefit the species? (It probably serves to regulate the size of populations and thereby to keep the Bettas from overcrowding an environment.)

--Do people have territories? (Yes, see also Activity 2.)

--How would you react if a stranger came over and stood 3" away from you and faced you square on?

--Ask the students how they would react if someone came in off the street and decided to move into their home.

--Although many students share desks, ask students about sharing with someone from another school.

--What if the Georgians began moving into North Florida and changing the laws?

--What if the Chinese began moving into Russia?

--What if the Martians did the same?

--Territory is to be expressed at levels of:
Immediacy
Locality
Regionality
Continentally
Hemispherically
Etc.

--What effect do you think this territorial feeling has upon animals when they are forced to become "refugees" for reasons such as:

Filling?
Draining?
Dredging?
Clearing?
Polluting?

Activity 2

Relate this concept to man's territoriality in urban environments.

Take the students downtown for a field trip.

See the Environmental Guide: The City, On Campus, Off Campus & Ecology Treasure Hunts for suggestions and semi-programmed materials.

Activity 3

Walk over to one of your students and begin to sit down in his or her lap. Draw the class' attention to the student's reaction. Begin a discussion using the following questions:

--Why did this student react as he/she did? Did I invade his/her territory?

--What is territory? Is there more than one kind of territory?

--How big is your physical space territory? How close can someone get before you get uncomfortable?

--How much space does your family require for its territory?

--Do groups of people have common territories? Think of the U. S. or of China.

--Other animals have territories also. Frequently they can be more defined than man's territory. Many of these animals, including man, will fight for their territories. How would this limit the population of a species in a given area? Will territorial effects ever limit man's population?

--How are man's territorial needs reflected in statistics on crime rates, suicide rates and psychological abnormality rates?

Activity 4

The basic needs of men and animals seem to be approximately the same. These needs include a suitable living area, freedom from stress, a territory, and a stable reproductive process. Have students consider the plight of a caged animal. Few animals readily adapt to this condition. Some reference study or a visit to a zoo will reinforce this understanding. Discuss a "caged" man. Such things as job pressures, tenement housing, crowded freeways, busy shopping centers, and overused recreation areas may serve to trap a human being.

--What other factors can you think of which tend to "cage" man?

--What influences an animal in its selection of a home territory?

--Do human beings consider the same things when seeking a place to live?

--Is the environment compatible with the needs of man? Explain.

--What adjustments or avenues of excape can man exercise to insure his well-being and survival that lower animals cannot make or use?

--How do rural, suburban and urban environments each suit or thwart the needs of men?

Concept E

Man is a group territorial animal. His governments and social behaviors reflect this.

Activity 1

Considering food or actually, arable land, as a relatively fixed or constant natural resource, hypothesize on unrestricted population growth. Determine the daily caloric intake of people in several representative countries among both the "haves" and the "have-nots." Obtain an outline map of the world and place these statistics in their appropriate places.

--Why are calories essential to life? (Calories are a measure of heat energy from our foods, and indicate the amount of energy we are taking in and using.)

--What is the recommended daily caloric intake for a human being? Upon what is this based?

--What is the fundamental source of the calories which man obtains from his food?

--How do you account for the differences in national average daily caloric intake as indicated on your map?

--Make some predictions about caloric intake in these countries in succeeding generations.

--What consequences do you foresee in those countries where population increase exceeds the increase in agricultural productivity?

--What alternatives do the leaders of these nations have available to them?

--How will a problem like this affect other, more fortunate nations of the world?

--What percentage of world population do we have in the U. S.?

--What percentage of world food production do we consume?

--Given answers to the two questions above, what further thoughts do you have about population increase in the United States?

--How do you think this will relate to group territoriality?

Activity 2

Relate this concept to the urban environment. Take your class downtown on a field trip.

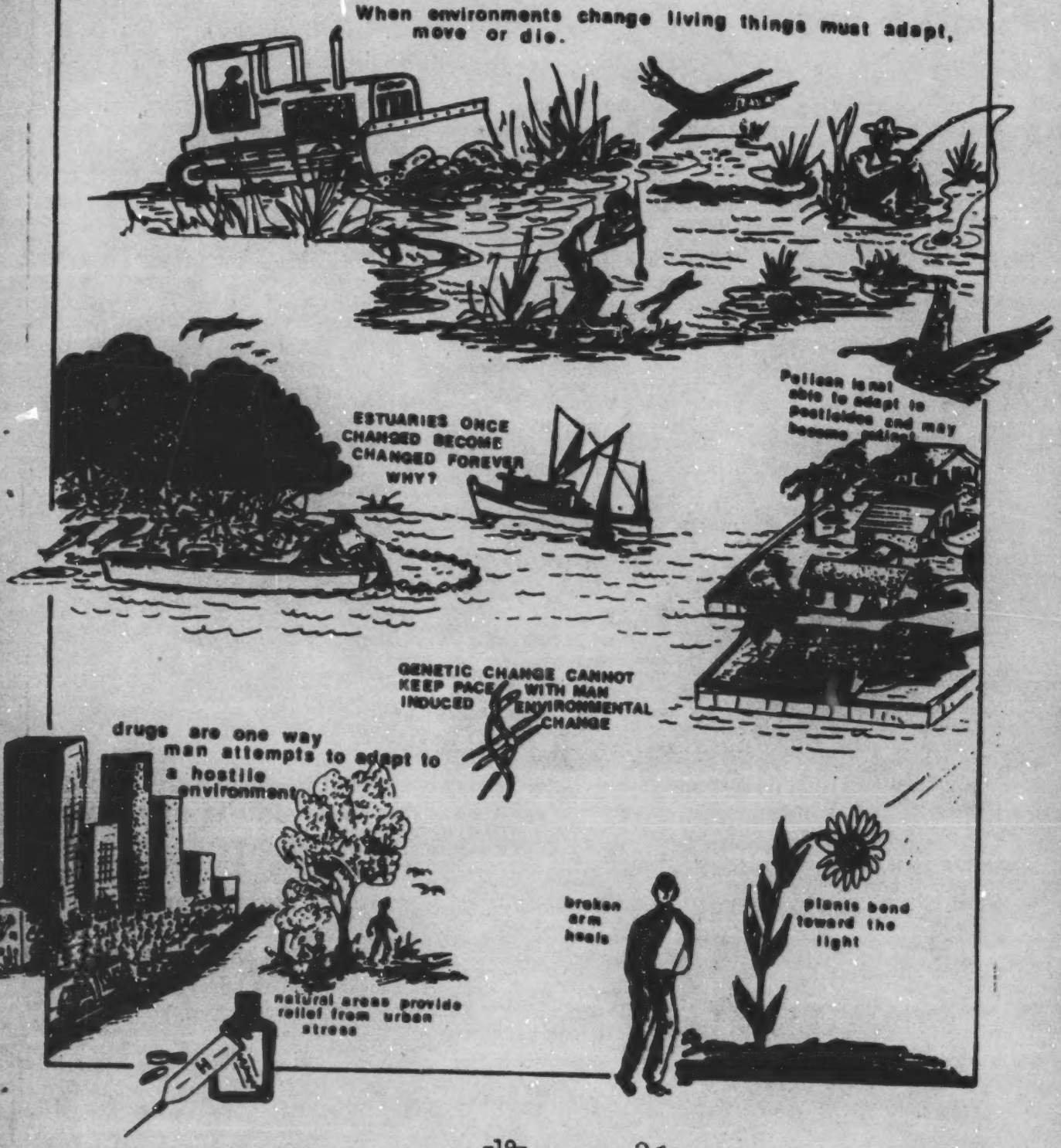
See the Environmental Guide: The City, On Campus, Off Campus & Ecology Treasure Hunts for information on field trips.

Activity 3

Show the filmstrips "Animal Behavior" and/or "There's No Place Like Home." These filmstrips are available from the Science Supervisor at Largo C & I.

CONCEPTUAL SCHEME II

Heredity and environment interact to determine the characteristics of an organism and, therefore, a population.


When environments change living things must adapt, move or die.
ESTUARIES ONCE CHANGED BECOME CHANGED FOREVER WHY?
Pelican is not able to adapt to pesticides and may become extinct
GENETIC CHANGE CANNOT KEEP PACE WITH MAN INDUCED ENVIRONMENTAL CHANGE
drugs are one way man attempts to adapt to a hostile environment
natural areas provide relief from urban stress
broken arm heals
plants bend toward the light

CONCEPTUAL SCHEME II

Heredity and environment interact to determine the characteristics of an organism and therefore a population.

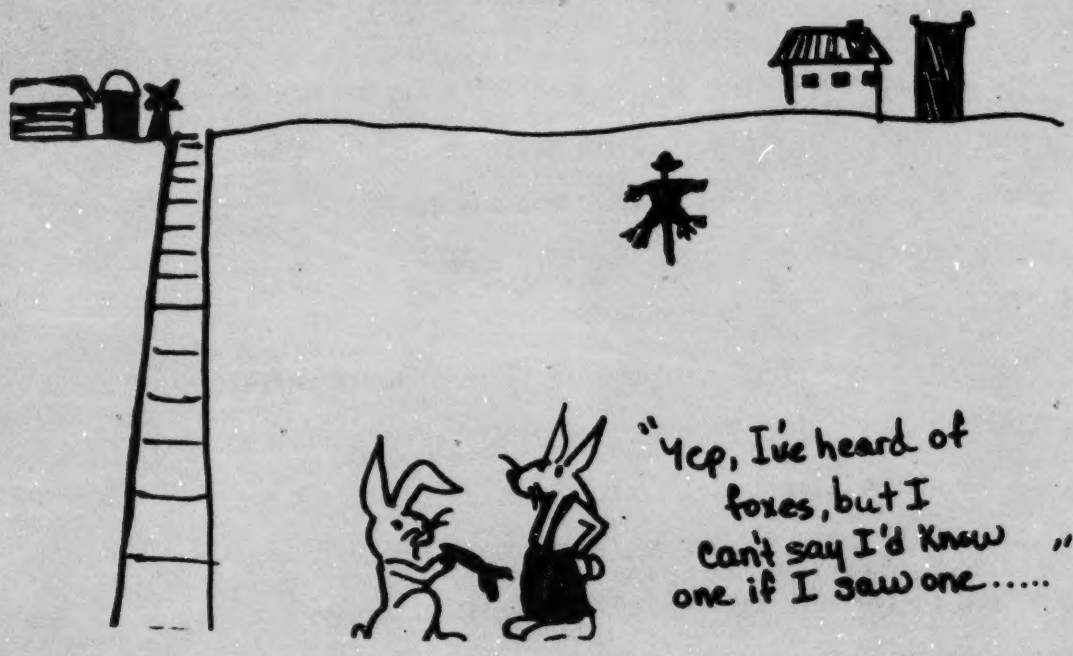
Why are you the way you are or a toad the way he is? As organisms developed in Earth history, their physical and behavioral characteristics were passed from one generation to another by genes through a system we have come to call the hereditary process.

The environment plays a major role in shaping the hereditary character of any population by sorting out those least fit to adapt to the prevailing environment. An organism whose genetic make-up does not allow it to live, feed, reproduce, or compete with others in the environment, will not be able to pass its genetic characteristics to a future generation.

On the other hand, animals and plants may alter the environment of an area to such an extent that the prevailing environment is changed, thereby, ultimately reshaping the hereditary characteristics of those who live there. Thus, heredity and environment are closely interrelated.

Concept A

Man induced changes in the environment stress populations until they die out.



Activity 1

Have students make a "mangrove line" (wiggly) on a piece of paper with a dot at the beginning and end of the line.

seawall - - - -

mangroves ————

Then have students draw a "seawall line" (straight) between the two dots. Now place string over the "mangrove line" and also over the "seawall line." Once the students have done this, have them mark the ends of the strings and pull them straight. Measure the lengths of the two strings and determine the difference between the two. Express the seawall length as a percentage of the mangrove coast.

$$\text{Seawall \% of mangrove coast} = \frac{\text{length of seawall}}{\text{length of mangrove}} \times 100$$

--Does the seawall considerably shorten the shoreline? (Yes)

--How would a shorter shoreline affect the animals living in this area?

(It would reduce the size of their populations since it would greatly reduce the bottom area which they live on or in. It would also reduce the surface area for sessile organisms to attach to. Mangrove prop roots have a large surface area compared to seawalls. See if the students can think of any other ways that it would affect these populations.)

--What other changes would occur in this environment if man created a seawall? (Fill the bottom, increase turbidity, deepen the water at the face of the wall, etc.)

Activity 2

Find out why these animals are becoming extinct; could it be due to changes man has caused?

1. Bald eagle
2. Manatee
3. Tiger
4. Peregrine Falcon
5. Loggerhead Sea Turtle
6. Pelican
7. Dodo bird

Activity 3

Use Lesson 18, "Scientific Effects and Consequences of Man's Modification of the Environment", Brennan's People and Their Environment, Science 7-8-9, p. 33. Couple this activity with a discussion of the effects of these environmental stresses on the organisms.

Activity 4

Read in Reflections on a Gift of Watermelon Pickle, p. 57, "Indians." List some other things you think of when Indians are mentioned.

--How has the environment into which we put the Indians influenced their race and culture?

Activity 5

Use the filmstrip "World of Endangered Wild Life," available from the Science Supervisor, Largo C & I.

Activity 6

Show the film "American Bald Eagle," available from the Media Center. This film, coupled with a good discussion, will illustrate the concept very well. Pinellas County #596-2-015.

Activity 7

Show the film, "The Harmony of Nature and Man," Pinellas County #979-2-008.

Concept B

Man may induce enough changes in the environment until he is no longer able to survive.

Activity 1

Students are presented with two piles of chance cards. One pile represents cash values from 5¢ to one million dollars all of which (theoretically) could be kept by the student. The other pile contains environmental values which range from 5 bottle caps disappearing, to the saving of Lake Erie. Each student gets 3 chances to pick cards. After all the students have picked, tally the results to show how many money cards were picked as opposed to environmental cards. The purpose of this activity is <u>not</u> to predict a <u>specific</u> cause for environmental disaster, but rather to identify the "human nature" profile which will allow such a crisis to occur. It should be pointed out that greed is not a term used to define any Floridians, but rather it is a worldly term and should be kept in that scope.

--Do you think man's monetary interests will make our environment unsuitable for human habitation? (Remember, that this doesn't need to be something super dramatic, but rather could be as simple as running out of water, polluting water beyond our ability to use it, losing our soil to erosion, air pollution such as that in Denora, Pennsylvania that killed several, or overpopulation relative to our food sources.)

--Is their any way that environmental losses can be computed in economic terms that will make industrialists and developers listen?

--Remember, that environmental degradation can be localized and won't be a problem for all people. Do you think the greedy will sacrifice some of their monetary gains for the benefit of others? Are there any true cases of this in today's world?

Activity 2

Divide the class into groups. Using a basic outline map of the community, have one group show the area as it exists today; have a second group show the area as it was 25 years ago; a third group should depict it as it was 50 years ago; and a fourth group, as it was 100 years ago. This information can usually be obtained from town records. To discover what your local area was like in the eyes of its residents, have one group interview residents of the town who have lived there for 25 years. Have another group interview a 40 to 50 year resident of the community. When all data has been collected and summarized, list the changes which have occurred.

--Were these changes helpful or harmful to the people; to the environment? Explain.

--Looking back, what could have been done to prevent the harmful changes?

--Looking ahead, based on what we now know, what changes do you foresee?

--Will these be helpful or harmful? Explain.

--Will the harmful changes destroy us?

-What can we do to prevent the harmful ones?

--How could this process you have employed be modified for use on a national scale?

Activity 3

Use Lesson 20, "Adaptability in Man", Brennan's People and Their Environment, Biology, p. 50. This lesson helps define man's adaptability.

Activity 4

Show the film, "Strand Breaks," Pinellas County #333-2-006.

Activity 5

Show the film, "The Rise and Fall of the Great Lakes," Pinellas County #977-2-002.

Concept C

Natural control of pests is more desirable than chemical pest control.

a) Most pests are small and have high reproductive potentials.

b) Their evolutionary potential allows them to adapt to harmful chemicals while larger animals, including man, cannot adapt to them.

Activity 1

Out of a small sack of river gravel (marbles can also be used), mark 10 stones with "A" for Adaptation. Mix the stones and proceed to define two sets of students - "the pelicans" and the "mosquitoes." Tell the students that there is a strange chemical in the air that can kill some of us. In order to survive as a species you must adapt. A new generation is created by picking stones. More stones increase the chance of picking an "A" stone. It must be pointed out that picking an "A" stone merely means there was a chance for adaptation, not a promise. Since pelicans breed slower than mosquitoes do, the mosquitoes get to pick 25 times for every one pick of the pelicans. The pelicans will complain but "such

is life." Let the pelicans choose two stones and let the mosquitoes pick 50. In life the chance of having a mutation that results in an adaptation is one in millions. Further, the chance that the adaptation is beneficial for the conditions present is one in millions. Thus you can see that the likelihood of a beneficial mutation occurring that will allow a species to quickly adapt to an environmental condition is very small for slowly reproducing animals such as pelicans or man. The chances are reasonable for mosquitoes and many other smaller insects.

--If an adverse environmental condition develops over a period of 10 years, do you think it is very likely that pelicans or man would adapt? (No, odds are against it.) What about mosquitoes? (Chances are good.)

--Many insects have adapted to DDT. Why haven't pelicans, ospreys, eagles, etc. adapted? (For the reasons given above.)

Activity 2

Show the Shell Oil Co., film, "Food or Famine." A free loan film.

--Why are insects a pest to man?

--Are all insects bad?

--How does man control the bad insects? Are there any harmful side effects in using chemicals to kill insects? What kinds of harm can be done?

--How do insects, such as flies, develop resistance to insecticides? What are some of the unique factors that allow insects to adapt so quickly while man and many birds do not adapt?

--What kinds of biological controls for insects have been developed? (Sterile males, insect viruses, insect predators, such as the lady beetle, sex attractants, etc.) Do you think that we could develop some effective biological controls if we would spend as many dollars on this kind of research as we have on chemical controls?

Activity 3

Make a scrapbook from newspapers and magazines of articles and advertisements that deal with man killing insects.

--How has this affected the insects?

--How has this affected man?

Activity 4

Write a letter to the American Agricultural Chemical Society. Find out how often in the last 5 years chemicals for spraying have been changed because the pests have become immune.

Concept D

Through environmental factors, certain hereditary characteristics of a population are selected for their survival value. (Natural selection)

Activity 1

Half the students are given one paper square (white) per person and asked to place ("hide") their paper on a dark object <u>without</u> covering the white square. The other half of the class has been asked to leave the room while the squares are being "hidden." Upon reentering the room the finders are timed in their pursuit of the white papers. Now the roles are switched and this time the "finders" get to hide the pieces they have found while the others leave. Again, no covering is allowed but this time colored pencils can be used to camouflage the papers. See the difference in the times.

--What if the papers were moths and the finders were birds, which group would survive?

--Show the filmstrip "Evolution and Natural Selection", Olin Keys to Basic Ecology, available from the Environmental Education Center.

Activity 2

Research the English Birch Moth and its adaptations.

See B.S.C.S. Green Biology book on page 682. To illustrate this example take two shoe boxes and paint the inside of one white and the other flat black. Cut squares out of black and out of white construction paper. Place an even mixture of the two colors in the bottom of each shoe box. Have a student pick up as many pieces of paper from the shoe box as he can in 20 seconds. He may only pick up one square at a time. Tally the number of white squares vs. black squares for each box and discuss the results with your students.

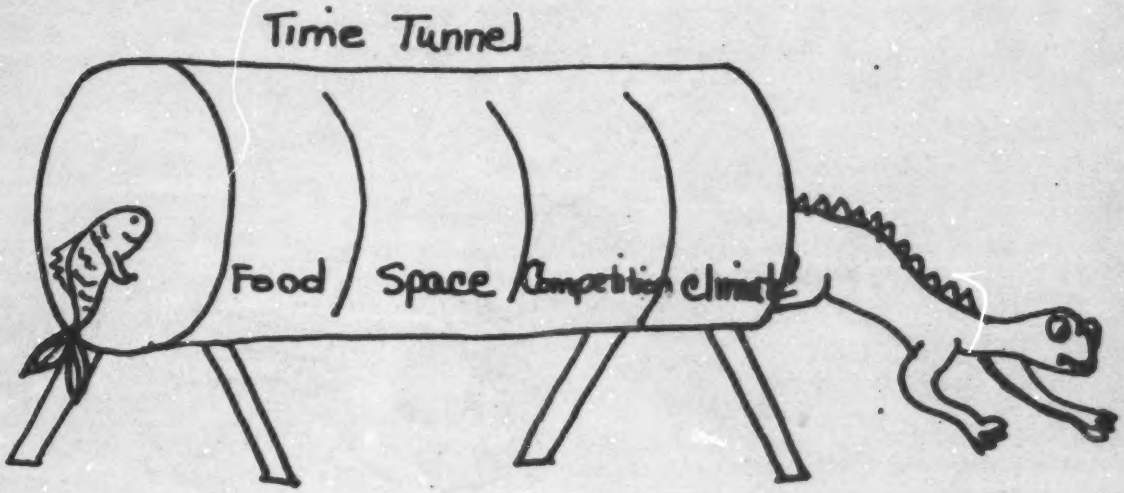
Activity 3

Lesson 22, "Natural Selection", Brennan's People and Their Environment, Biology p. 53.

Develops understanding of natural selection and how man influences natural selection by changing the environment.

Concept E

Through natural selection a species changes with time (evolution).



Activity 1

Use Section 12, "Change Through Time", Interaction of Man and the Biosphere (IMB), pp. 274-298. This selection is excellent and will provide your students with a good feeling for evolution. Couple this activity with the filmstrip listed in Activity 2.

Activity 2

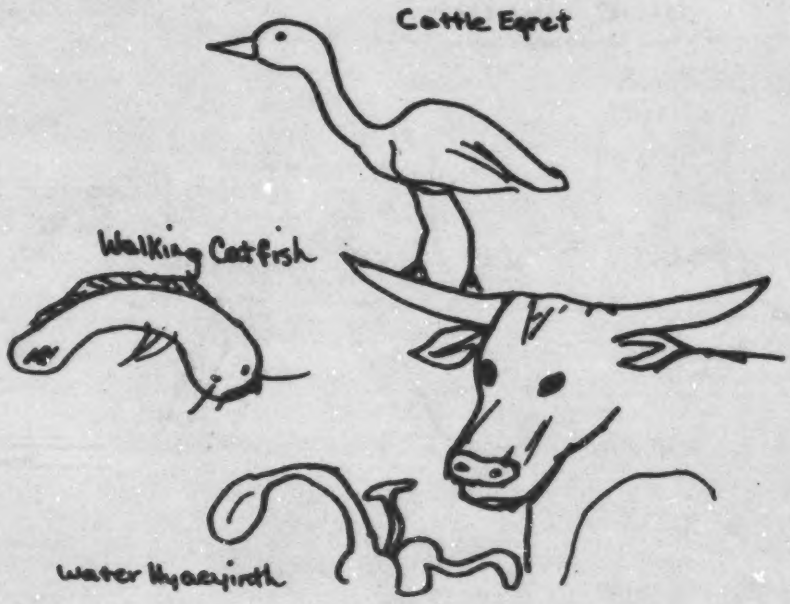
Show the filmstrips "Extinct, Endangered and Threatened," available from the Science Supervisor, Largo C & I.

Activity 3

Show the film, "Evolution" Pinellas County #574-1-021.

Concept I

Successfully introduced exotic plants and animals frequently displace native organisms and become pests.



See also Conceptual Scheme VI, Concept E.

Activity 1

Use cameras to take pictures of exotic plants and animals in Florida. Let your students take pictures of exotics such as Melaleuca (Punk Tree), Australian Pine, Water Hyacinth, or Brazilian Pepper. Have the students take pictures of these plants in wild areas. The pictures should show the effects of the plants on the other plants in the area. No grass or other plants grow under the Melaleuca trees and if the edges of the stands are examined, one can see that these are displacing the native trees. The students' pictures should reflect all of these things. With the Water Hyacinth they could show the difficulty of paddling a boat through the Hyacinths, etc. Have

another segment of the class do research on exotic animals. When the pictures and data are collected, have small groups of students make peer-produced booklets that show the exotics and their effects on the environment. Contact the Environmental Education Center for assistance in producing peer-produced booklets.

Activity 2

Water Hyacinth study

--In what year were Hyacinths first discovered in Pinellas County? When were they first considered a pest?

--How have Hyacinths produced a problem in Pinellas County? How do they affect boating? Fishing? Swimming? Water flow?

--What methods of Hyacinth control are available? Which methods are currently being used in Pinellas County?

--Why do they grow so rapidly and suppress our own local water plant species? Are they a big problem in the country they came from?

--What do you think would happen to our water resources in Pinellas County if the Hyacinths weren't controlled at all?

For more information write to Southwest Florida Water Management District, P. O. Box 457, Brooksville, Fla. 33512, for a report on water plants that have become pests.

Activity 3

As a class experiment, try to grow exotic plants in the same area with common plants. Record their growth and watch the relationship among all the plants.

--Did the exotic plant displace the native species?

--Do exotics always displace native plants? Why?

--Why do some exotics become pests while others can barely compete?

Activity 4

Use Lesson 21, "Adaptability in Plants and Animals", Brennan's People and Their Environment, Biology, p. 52. The more specialized an organism becomes the less adaptable it is and the less able to survive environmental change.

--Are troublesome exotics adaptable to change?

Activity 5

Show the film, "Adaptations to Ocean Environments," Pinellas County #574-2-035.

CONCEPTUAL SCHEME III

Living things and environments are in a continuous state of c

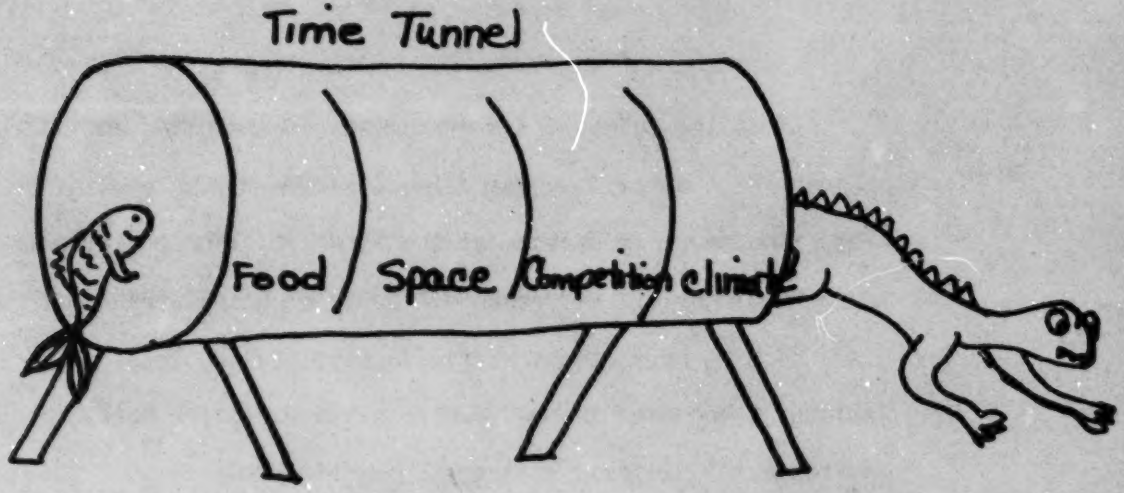
CONCEPTUAL SCHEME III

Living things and environments are in a continuous state of change.

All living things and environments are involved in natural changes which we call cycles. These cycles may be growth, reproduction or other aspects of the life cycles characteristic of the natural world. Some changes may be of a non-biological nature. Since nothing on earth is static in its make-up, location or relationship to other things, a mere passage of time marks change in environmental systems, whether it be life or death in a food web, or uranium decaying to lead.

Concept A

Through Natural Selection species change with time (evolution).



See Conceptual Scheme II, Concepts D and E.

Concept B

Man has the capacity to make major changes in the environment. Dredge and fill induces environmental changes.

See also Conceptual Scheme I, Concept A and Conceptual Scheme V, Concept B.

Activity 1

Students should prepare a class report on the ecology of an estuary which will illustrate what is being sacrificed in terms of plant and animal life in return for residnetial and industrial building sites. Encourage them to illustrate the principal points.

--What is an estuary? (An area where fresh and salt water mix.)

--Why is an estuary so important to the development of many organisms? (It is an area rich in food materials and protective hiding places.)

--How does dredge and fill affect marine life? (Kills it.)

--What can be done to prevent or limit building in these areas? (Good planning and zoning.)

--What are the rights of individuals or corporations to whom these areas belong? (Depends on the way the property was zoned when they bought it.)

--Do they have the responsibility to consider the effects of their ventures on the environment? (Yes.) How should they express this responsibility? (Responsible development.)

--How do we choose which wetlands to preserve and which to develop in response to the needs of an expanding population? List specific criteria that should be used in making a determination.

Activity 2

Have students map the area of a city in Pinellas County as it was 50 years ago. (Contact a local land survey office or locally established realtor for information.) With an acetate overlay have students mark the dredged areas that exist today. (Information from recent real estate maps.) Have students estimate the number of miles of man-made canals, square miles of filled areas and square miles of dredged areas. Relate this dredging to the resultant environmental degradation.

Activity 3

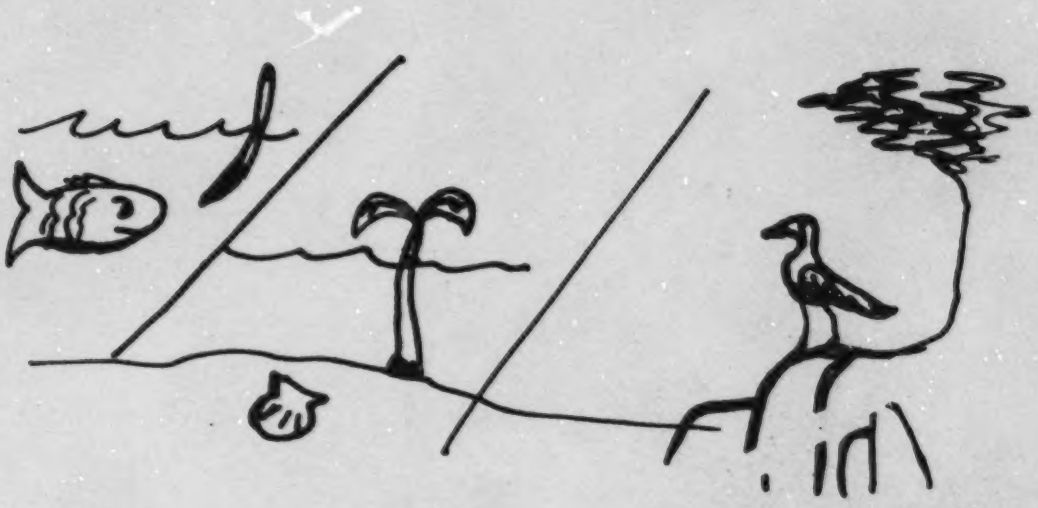
Show the film, "Rise and Fall of the Great Lakes," Pinellas County #977-2-002.

Activity 4

Show the film, "Tomorrow's Children," Pinellas County #301-2-001.

Concept C

Succession is a natural and predictable change in communities.



Activity 1

Show the film "Succession - From Sand Dune to Forest", Pinellas County #574-2-029. Relate, through discussion, this film to Florida's major successional stages. For dry areas these stages are pioneer - weedy stage, pine flatwoods, and finally, hardwood hammock. The hammock is the climax stage in this area.

Activity 2

With some modification to adapt the activities to the local area, the following activities from Brennan's People and Their Environment, Biology, will be useful.

Lesson 30, "Plant Succession in a Pond", p. 70

Lesson 31, "Succession On Bare Rocks", p. 71

Lesson 32, "Succession In A Forest", p. 73

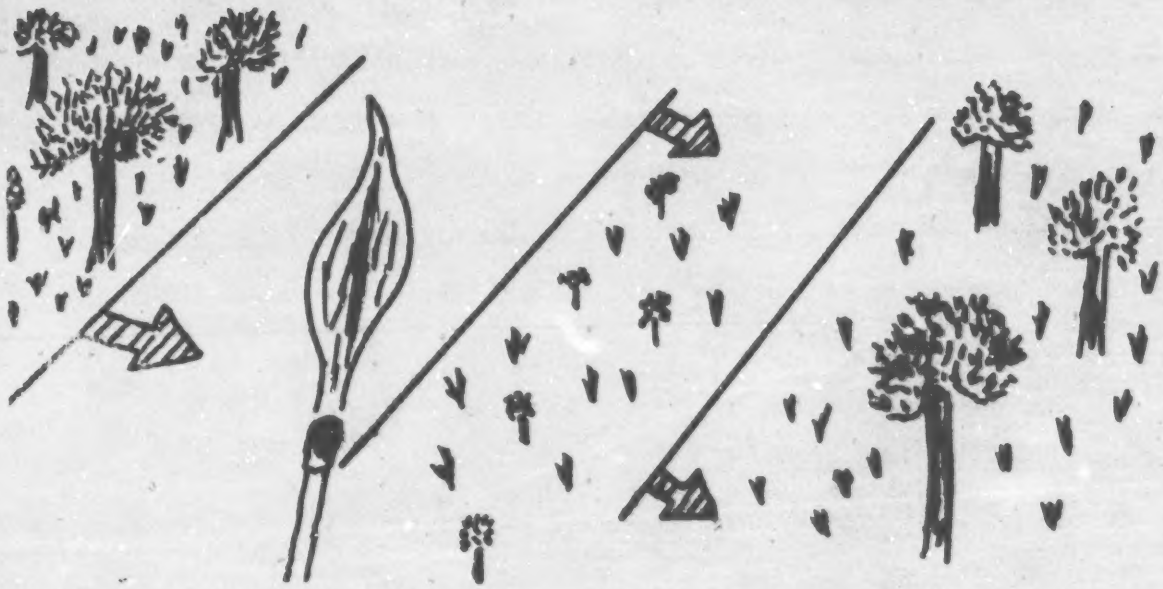
Lesson 33, "Plant Succession on Sand Dunes", p. 74

Lesson 34, "Succession In A Field", p. 77

Lesson 35, "Plant Succession in the Schoolyard", p. 78

Concept D

Many natural areas require fire to preserve them.



Activity 1

Have an Urban Forester come in and talk to your classes about forest management through the use of fire.

Activity 2

Pine flatwoods require fire to keep them from changing to hardwood hammocks. In the absence of fire, oaks and other plants begin growing in the flatwoods until enough shade covers the ground so that the sun-loving pine seedling cannot grow. As more oaks grow their leaf debris modifies the soil and other hammock species begin to invade the area. New pine trees are unable to germinate. Though a hammock can burn, the lack of low growing vegetation and the higher content of water in the leaf litter retard fire. Lightning has for centuries caused fire in the pine flatwoods and retarded succession at the pine flatwood stage, but, as man developed forestry practices, he saw all fire as bad and he retarded fire

in the flatwoods. This caused oak infringement in the pines and soon the pine forests were not as productive as they once were. No foresters maintain pine flatwoods through controlled burning. The pine trees can withstand the fire because of their insulative bark and the fire resistant seedling stage. This is only one example of fire ecology. Students can see this example in almost any part of the county.

--What would happen if a fire started in a pine flatwoods community that hadn't been burned for several years and had oaks growing under the canopy of the pines?

--How does palmetto survive fires? How about cabbage palms? (Both have extensive underground trunks.)

--Do cypress trees require fire for survival? Why not? Will they burn?

--Does fire ever hurt a forest?

Activity 3

Burn a small plot of land on the school campus and have the students carefully record, through drawings and descriptions, the changes that the area undergoes as it regrows. Relate this activity to Activity 1. When the area has recovered, have the students prepare a bulletin board display illustrating the stages of recovery.

--Did the fire kill everything? What survived?

--Where did the plants come from that began growing in the area after it was burned?

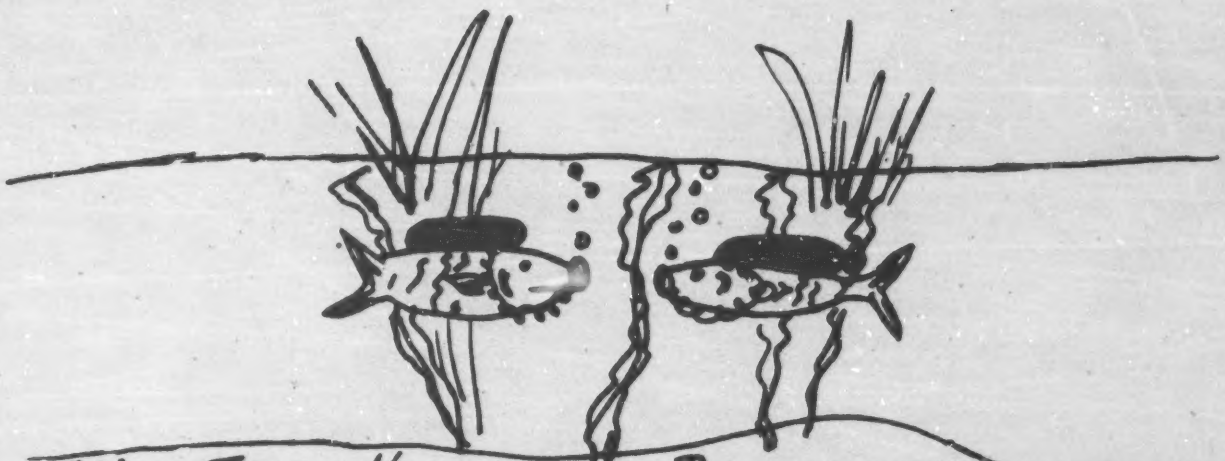
--Do you think that any of the plants in your area were adapted to fire? How were they adapted?

--Did new green come from any of the blackened plants?

--How did fire harm the area? How did it help the area?

Concept E

When man allows animals' excrement, his own waste and his fertilizers to run into the water, he speeds up the natural processes of eutrophication.



Activity 1

Make a careful study of the waste disposal problems of your own area. Make a large wall map showing those areas where fertilizer, excrement and other wastes run into water. Note the length of time this has been done. Discuss with local officials their current and future plans to meet the waste treatment needs of our County. Tape some interviews with private sanitation and public sanitation workers. Compare the problems of waste disposal in large areas with those of the less populated areas. Use the middle school units that deal with eutrophication.

Activity 2

Show film, "The Aging of Lakes" Pinellas County #331-2-003. Also show the film "A Town That Washes Its Water" Pinellas County #628-2-003.

Activity 3

Write for pamphlet, "Eutrophication", Department of Pollution Control, Tallahassee, Florida 32304.

Activity 4

Use Lesson 16, "The Control and Utilization of Wastes" in Brennan's, People and Their Environment, Social Studies 10-12, p. 25.

This lesson helps students realize that scientific disposal and utilization of wastes are vital to the preservation of man and the environment.

Activity 5

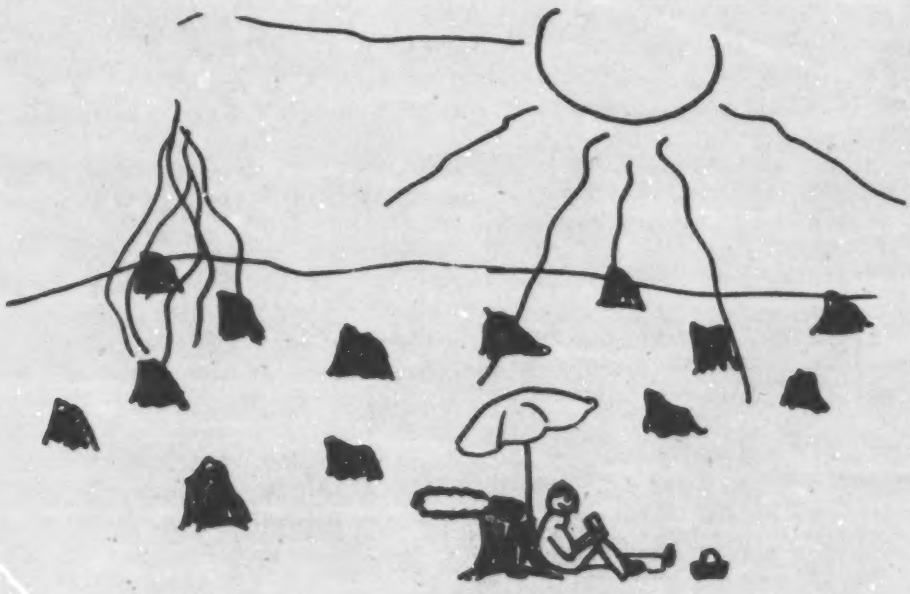
Show the film, "Water Pollution," Pinellas County #628-2-006.

Activity 6

Show the filmstrip, "The Polluted Planet," available from Science Supervisor, Largo C & I.

Concept F

Through air pollution and other methods man has the power to change the climate of an area.



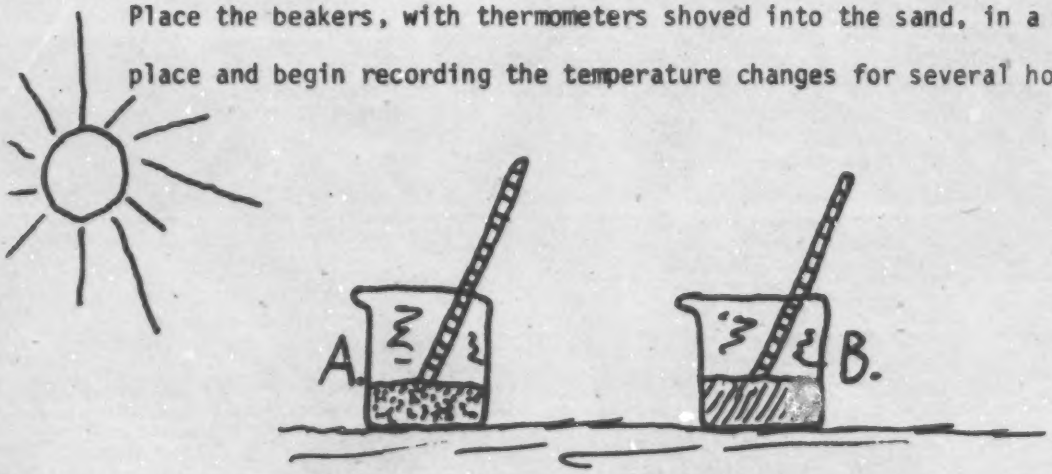
Activity 1

Using beakers with sand only and sand/water, compare the temperature differences of the soil over a given period of time.

Beaker A Sand and water

Beaker B Dry sand

Place the beakers, with thermometers shoved into the sand, in a sunny place and begin recording the temperature changes for several hours.



Compare the temperature changes as the sun beats down on the sand.

Record the temperatures at regular intervals and use the data to construct a graph.

--Did you know that in Oklahoma the state's average humidity has been changed due to an expansive reservoir system? (Allows greater amounts of moisture to be placed into the atmosphere. This and the large bodies of water tend to moderate the high and low temperatures.)

--Does the wetness tend to moderate change? (Yes, the high specific heat of water allows it to absorb large amounts of heat and to release that heat slowly on cold days.)

--Would draining many of Florida's wetlands possibly affect our local temperatures? (Yes, this alters the heat absorbing characteristics of the land. It will produce higher high temperatures and lower low temperatures.)

--How does air pollution affect the temperature and wetness? (Air pollutants act as seed crystals on which droplets of water readily form, thus increasing the chances of rain. Since clouds act as blankets, in that they reduce the amount of heat escaping from earth, air pollutants can also cause temperatures to rise.)

--Do we have air pollution problems in Pinellas County? (Yes, in addition to the air pollution we produce locally, an increasing number of days each year bring us pollution from Tampa.)

Activity 2

Use Lesson 50, "Contaminants in the Earth's Atmosphere", in Brennan's, People and Their Environment, Science 7-9, p. 94.

This lesson helps the student observe and investigate how pollution occurs through an experiment and a discussion. The student is made aware that our atmosphere can be drastically changed by the activities of man.

Activity 3

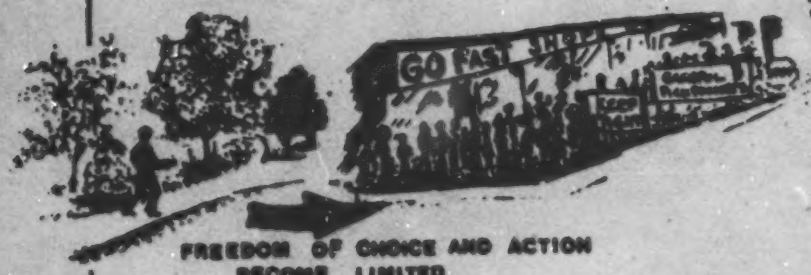
Show film, "Air Pollution," Pinellas County #628-1-005, available from the Media Center.

Activity 4

Send for film, "The Poisoned Air", 50 min., B/W. Free. National Medical Audio-Visual Center (Annex), Station K, Atlanta, Georgia 30324.

CONCEPTUAL SCHEME IV

As a population increases, its effects on the environment become more pronounced.



FREEDOM OF CHOICE AND ACTION BECOME LIMITED

ENVIRONMENTAL STRESS

OCCURS WHEN DEMANDS ON ENVIRONMENTAL SYSTEMS RESULT FROM INCREASED POPULATION DENSITIES

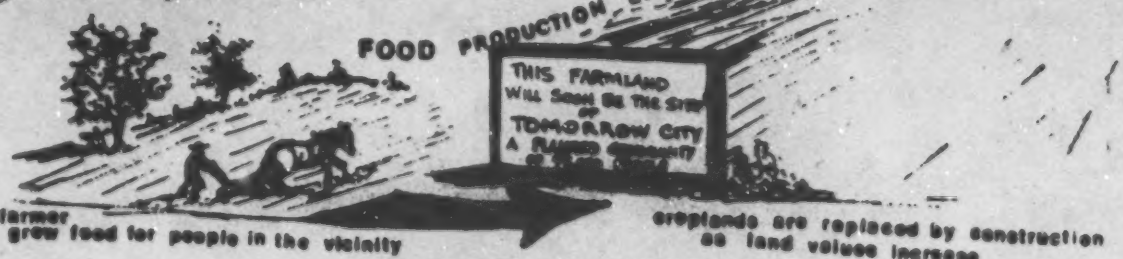
- resources become stressed
- individual freedoms & choices become limited
- living costs & taxes increase

TERRITORIES BECOME SMALLER AND DEFINED

ALL NATURAL SYSTEMS HAVE CHECKS

RESOURCES BECOME STRESSED

FOOD PRODUCTION LAGS BEHIND GROWTH



farmer grow food for people in the vicinity

croplands are replaced by construction as land values increase

Increasing populations stress food supplies and resources at a faster rate than the population grows because each new generation demands a higher standard of living than its predecessor.

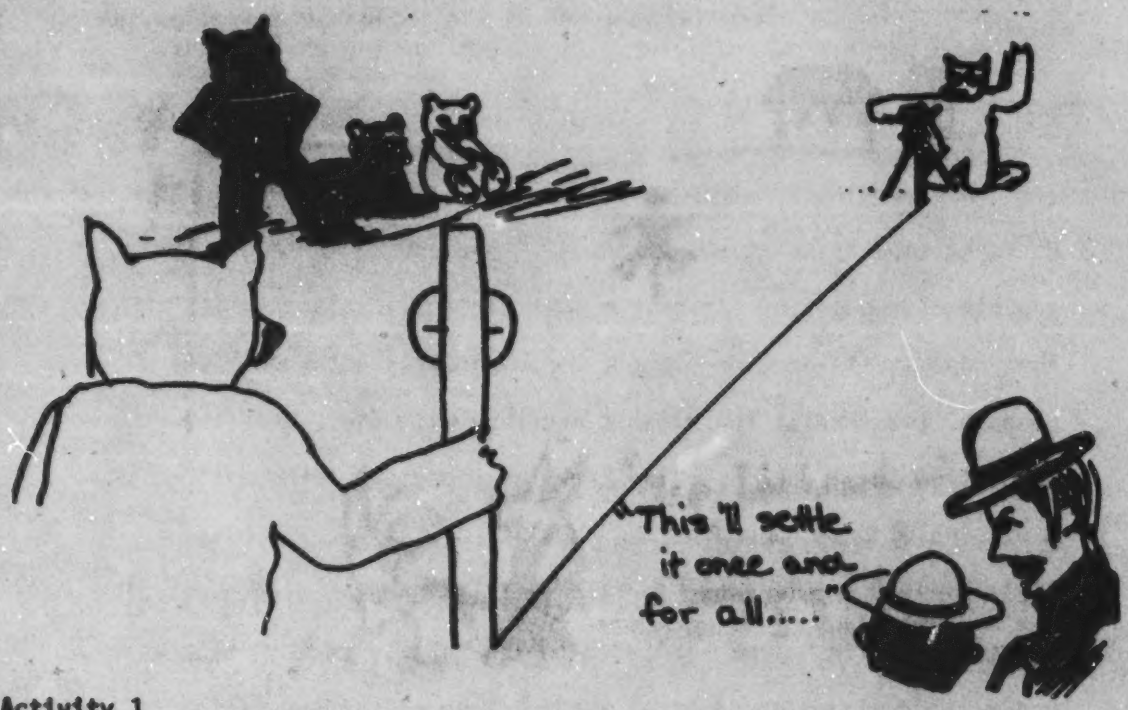
CONCEPTUAL SCHEME IV

As a population increases, its effects on the environment become more pronounced.

As a population expands it approaches a limit known as the carrying capacity of the environment. The environment is only capable of supporting a finite number of individuals and, if that capacity is exceeded, the environment will not supply the needs of the surplus individuals and they will die. When the population levels are near the carrying capacity of the environment, individual members of the population will receive only their minimal requirements for life. This fundamental ecological principle applies to man and also to the quality of life that we enjoy. Our planet has finite resources and as the population expands those resources will be distributed to individuals in ever decreasing allotments. Thus, as man's population grows, his standard of living will be reduced.

Concept A

Members of a population tend to exhibit definite spatial distributions.



Activity 1

Obtain a current road map of Florida. Using all the keys available on the map try to make some generalizations concerning the population densities in Florida.

--If you draw a line 5 miles inland from the edge of the sea, what percentage of the population would live in this narrow strip around the state?

--Why do people concentrate in this area?

--Ecologically, is this the best place for them to live? Why or why not?

--Why have the Orlando, Tampa, Jacksonville, and Miami areas grown so large? Is this a good thing?

Activity 2

The population of the U. S. has changed from a rural one to an urban one. In 1910, 7 out of 10 Americans lived on farms and in 1960, 3 out of 10 lived on farms.

--What caused the movement?

--How did life change for man after the movement to the city?

--What environmental changes had to occur to accommodate man?

Activity 3

Have students research the territorial behavior of any or all of the following animals:

Black Bear

Cougar (Florida Panther)

Warblers

Deer

Eagles

Osprey

Ant Lions

Have the students try to answer these questions.

--Why do these organisms have territories?

--How do they protect their territories?

--If there were only room for 50 animal's territories in an area, what would happen if 100 were placed in the area?

--Is man a territorial organism?

--How does he protect his territory?

--What happens to man if his territories become overcrowded?

Activity 4

Go on a downtown field trip. See the Environmental Guide: The City On Campus, Off Campus and Ecology Treasure Hunts for suggestions and semi-programmed materials.

Concept B

Man has modified his environment to the extent that some of the processes of natural selection no longer act on the population.

Activity 1

Discuss phenol ketonuria, hemophilia, or other types of inherited diseases that have in the past kept these people from reproducing.

--Do these people pass their disease on to their children? Will the number of these people increase? Why?

--What has modern day medicine done to the composition of our population?

--Do you think resistance to disease is related to heredity?

--What would happen to our population now if we had to restrict medical assistance? Can we afford to give up medicine now?

--Why did the populations in Africa and South America increase so rapidly after modern medicine was introduced? What would happen to those populations if we removed the medical assistance?

Activity 2

Set up a debating team with this topic: Resolved: Unless man can maintain some measure of individual freedom and dignity and avoid the functions of overcrowding, he will destroy himself by shock or increasing strife, resulting in nuclear oblivion or depletion of his resources.

Activity 3

Assign students to research the spread of starlings in America. Have an oral discussion trying to resolve the following questions.

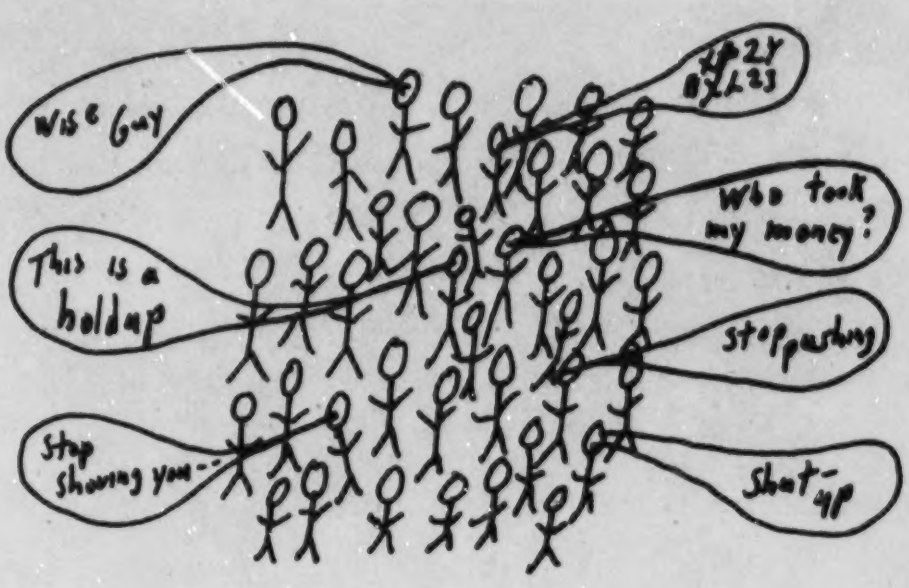
--How does the spread of starlings in America illustrate the effect of no limiting factors? In what ways? Explain.

--How do starlings relate to man?

Show the filmstrip, "Overpopulation," available from Science Supervisor, Largo C & I.

Concept C

Human population size, like that of other organisms, will be limited by environmental controls. However, by the time the carrying capacity level for humans is reached, the quality of life will be very unpleasant. a) Overcrowding in man leads to increased aggression (crime rate).



Activity 1

Keeping in mind that the population of this county has increased approximately 20% over the last ten years, ask the students to complete this chart by determining the percentage of increase.

INDEX OF CRIME

1960-1970

per 100,000 population

Offense	1960	1962	1964	1966	1968	1970	% Increase
Murder	5	4	5	6	7	8	
Robbery	60	59	68	80	131	172	
Burglary	500	526	624	708	915	1068	
Larceny ($50+)	282	308	384	457	636	859	

--Upon completing the computations have students list as many reasons as possible for this disproportionate increase.

--How many of these reasons could be related to the often heard phrase "population explosion"? (Sociologists indicate that increased crowding results in increased crime rates.)

--Does it appear that populations do have comfort zones? (Many feel that as a population rises above 40-100,000 in a city that all other disorders such as crime begin to grow at an alarming rate.)

--What happens when populations go above governmental capabilities? (Higher taxes and more bureaucracy.)

--What happens when populations are very small? Do they support governments? (Yes and at less cost to the public.)

--Do you think the crime rates will ever come down again?

--How much of this increase in crime is related to changing social values rather than density? (Comparing crime rates per 100,000 in a small city versus a large city such as Jacksonville could help answer the question. Large city crime rates are significantly higher.)

--Theorize as to the reasons for density-related crime? Compare the crime in single-family residential areas versus highrise apartments. What does the difference in crime rates have to do with territoriality?

Activity 2

Draw the United States and Europe on large poster board paper (to scale). Locate at least 10 large cities with a population of at least 1 million on both and mark them with bright red stars. Find the crime rate of each starred city and mark it next to the city in black. Now locate at least 10 smaller cities with population under 1 million and mark them with a blue dot. Find the crime rate of each blue dotted city and mark it next to the city in yellow. Make a key at the bottom of your posters.

--Is there a large difference in the crime rates of cities where there is apparent overcrowding? If so, why?

--Where would you expect the crime rate to be at its lowest? Highest?

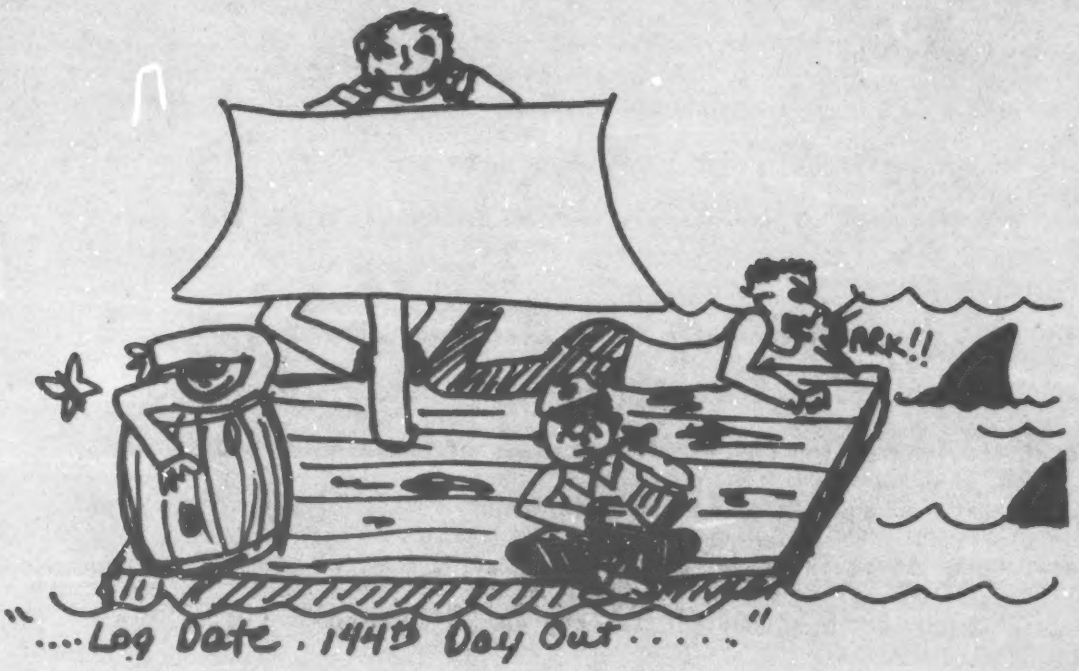
--Why is the crime rate higher in crowded areas?

--Within Pinellas County which areas have the highest crime rates?
Are these generally considered the most urban and crowded areas?

--How could you keep crime rates down without more policemen?

Concept C (continued)

b) Overcrowding in man leads to abnormal behavior (suicide, psychological disorders, etc.).



Activity 1

Perhaps narcotics addiction might serve as a reasonably valid gauge for psychological pressures experienced by a population as drugs are most often used for an escape from these pressures.

Have students study and graph the following table:

NARCOTICS ADDICTION IN THE U.S.A.

per 100,000 population

1960	1968	1969	1970	% of change
25	32	33	34	37.6

Refer to "concentric population rings" (Scheme IV, Concept C, Part c) in relating to 100,000 people over 10, 20, 30, 40 or more years.

Discuss correlations between the following terms:

caged man	urban
population	stagnant air
tenement	garbage
job pressure	overusage
peer pressure	depression
rush hour	suppression
traffic	aggression

--By contacting a drug rehabilitation program try to answer the question: Is the frequency of narcotics addiction greater in big cities?

Activity 2

Mark off an area 6 feet square in the classroom, suggesting that this represents the environment. Have one student (students representing population) enter the space. At intervals of one minute, add students to the area in the manner of a geometric progression (representing population growth: 1, 2, 4, 8, 16, 32, etc.). No student should be in contact with any other student inside the area. Continue until no more students can enter the area. (Note that, as the population of this area increased, each student had less space available for himself.)

--What percentage of the class was able to enter the area?

--How long did it take to fill one-half the area? To fill the entire area?

--Suggest some additional deprivations that individuals would suffer under actual conditions of high density.

--Is there a limit to what the world population can safely become?

--Do you think tension increased as the population grew? Why?

--Does this experiment accurately depict the real environment? Why not? Where would the individuals get their food if they were standing on all the available ground? How much space does each person really need to satisfy his basic needs?

--What kinds of psychological problems would the individual face as the land availability approached the minimum required for each person?

Activity 3

The basic needs of men and animals seem to be approximately the same. These needs include a suitable living area, freedom from stress, territory, and a stable reproductive process. Have your students consider the plight of a caged animal. Few animals readily adapt to this condition. Some reference study or a vist to a zoo will reinforce this understanding.

Discuss a "caged" man. Such things as job pressures, tenement housing, crowded freeways, busy shopping centers, and overused recreation areas may serve to trap a human being.

--What other factors can you think of which tend to "cage" man?

--What influences an animal in its selection of a home territory?

--Do human beings consider the same things when seeking a place to live?

--Is the environment compatible with the needs of man? Explain.

--What adjustments or avenues of escape can man exercise to insure his well-being and survival that lower animals cannot make or use?

--How do rural, suburban and urban environments each suit or thwart the needs of men?

Activity 4

Write letters to various state mental institutions for information on abnormal human behavior. Ask specifically for information concerning the numbers of admissions from large urban areas versus the number of small rural areas.

--Which area showed the greatest incidence of psychological disorders? (Remember to calculate the percent of disorders from each area and do not use raw data.)

--Why is there a greater incidence of disorders in the urban areas?

Activity 5

Show the film, "The House of Man--Our Changing Environment" Pinellas County, #333-2-002. Relate this film to the effect of crowding on psychological disorders.

Activity 6

Read "Apartment House" from Reflections On A Gift of Watermelon Pickle, p. 39.

--What two metaphors are used in this poem?

--Why have apartments become more numerous?

--If you have ever lived in an aprtment, write a paragraph on whether you liked it or didn't like it.

--If you have not lived in an apartment, write a paragraph telling what you think you would like or dislike about it.

--How would living in an apartment alter your psychological adjustment?

Activity 7

Show the filmstrips, "Overpopulation" and "People in Poverty," available from the Science Supervisor, Largo C & I.

Activity 8

Obtain the game "Population" from the Science Supervisor, Largo C & I.

Concept C (continued)

c) Crowding of humans results in increased incidence of physiological disease.

Activity 1

The following statistics are offered to the students for contemplation:

DEATHS DUE TO CANCER AND HEART DISEASE

1904-1970

per 100,000 population

Year	1904	1924	1944	1949	1950	1950 (revised)	1970
Cancer	68	87	123	134	137	139	162
Heart	153	169	303	325	327	356	360

As cancer and heart disease are so closely linked to pollution and other modern day "additives", it is felt that these two ailments may well act as barometers for physiological disorders related to the population explosion. Have students graph the above chart. Have students speculate

on these figures without having specific information on the nature of these diseases. Discuss population pressures and its effect upon general health.

--How do you think the rates of these diseases in rural situations would compare to those in the city? (Find out.)

Activity 2

Have an official from the County Health Department come to speak to your classes about contagious diseases. Have him discuss their ease of transmission in crowded areas vs. uncrowded areas.

--Is Lee County beginning to get large enough so that contagious disease epidemics will become more prevalent?

--Is the crowding at school more conducive to disease transmission?

--Compare the spread of contagious diseases through an apartment building with the spread of the disease in a single-family residential area.

--Is our population becoming large enough for a country-wide spread of diseases such as Asian flu?

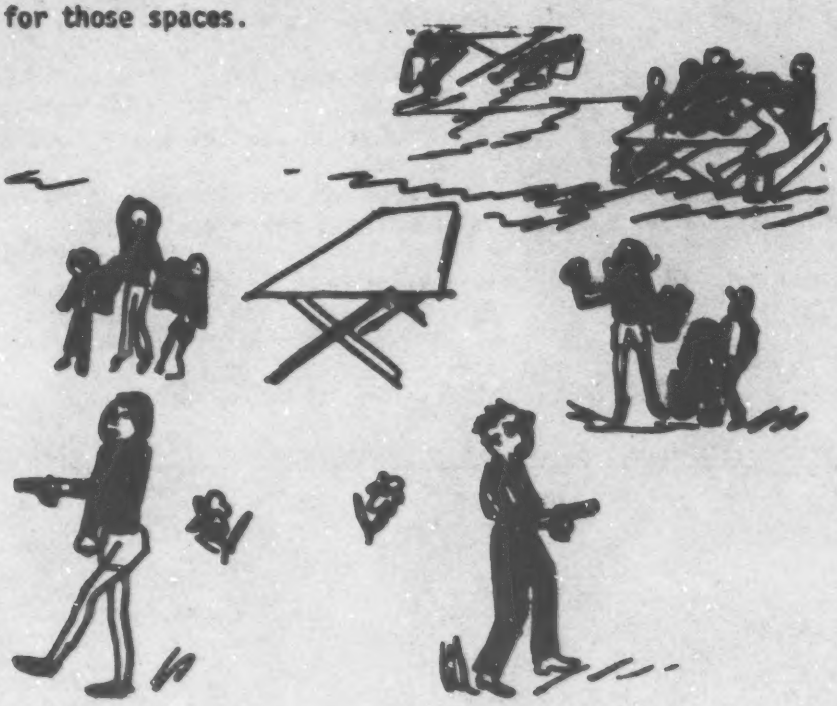
--What can be done to minimize the spread of these contagious diseases?

Activity 3

Show the filmstrip, "Overpopulation" available from the Science Supervisor, Largo C & I.

Concept C (continued)

d) As the demands for space and land increase, competition among humans will increase for those spaces.



Activity 1

Remove one chair each day from the class and note the student behavior as competition increases for the remaining chairs. The chairs would have to be removed before class and unknown to the students. A small corps of close-mouthed students might act as statisticians for the experiment. However, the resulting antagonistic attitude in the dechaired group will serve as testimonial for this concept, regardless of accurate records.

--Is this competition for space a real phenomenon? (Yes. Competition for land, parks, lots to build on, etc. is increasing every day.)

--Do you think national and state parks will ever regulate attendance on the basis of a lottery? (Many already do and in the next 10 years several of our national parks will go on this system.) Is this competition for space?

--Can you think of any areas where man competes for the use of land such as residential vs. agricultural? (There are many areas like this all

over the country.)

--In Europe there are cities where people have to wait to get a place to live before they get married. What do you think is happening to the couples average age at the time of marriage? (Yes, it's going up.)

--As the competition for space increases, what do you think the future will be like? (Try to answer this question accurately without going too far out. Maybe the students could write a paper on this.)

--What will happen to the cost of space as it gets scarce? (Go up.)

Activity 2

Take your class downtown on a field trip. See the Environmental Guide: The City, Off Campus, A Walk to the Park and Ecology Treasure Hunts.

Activity 3

Show the filmstrip, "Overpopulation," available from the Science Supervisor, Largo C & I.

Activity 4

Have a group of students compose a skit with the basic theme "Too Many People Live Here." Have them include the problems in everyday life that they encounter (competition for food, materials, space, water, etc.).

Activity 5

Use Lesson 52, "How Population Growth Has Increased Man's Need For Land", Brennan's People and Their Environment, Social Studies 10-12, p. 85. This lesson points out the competition between using land for housing and using it for recreation.

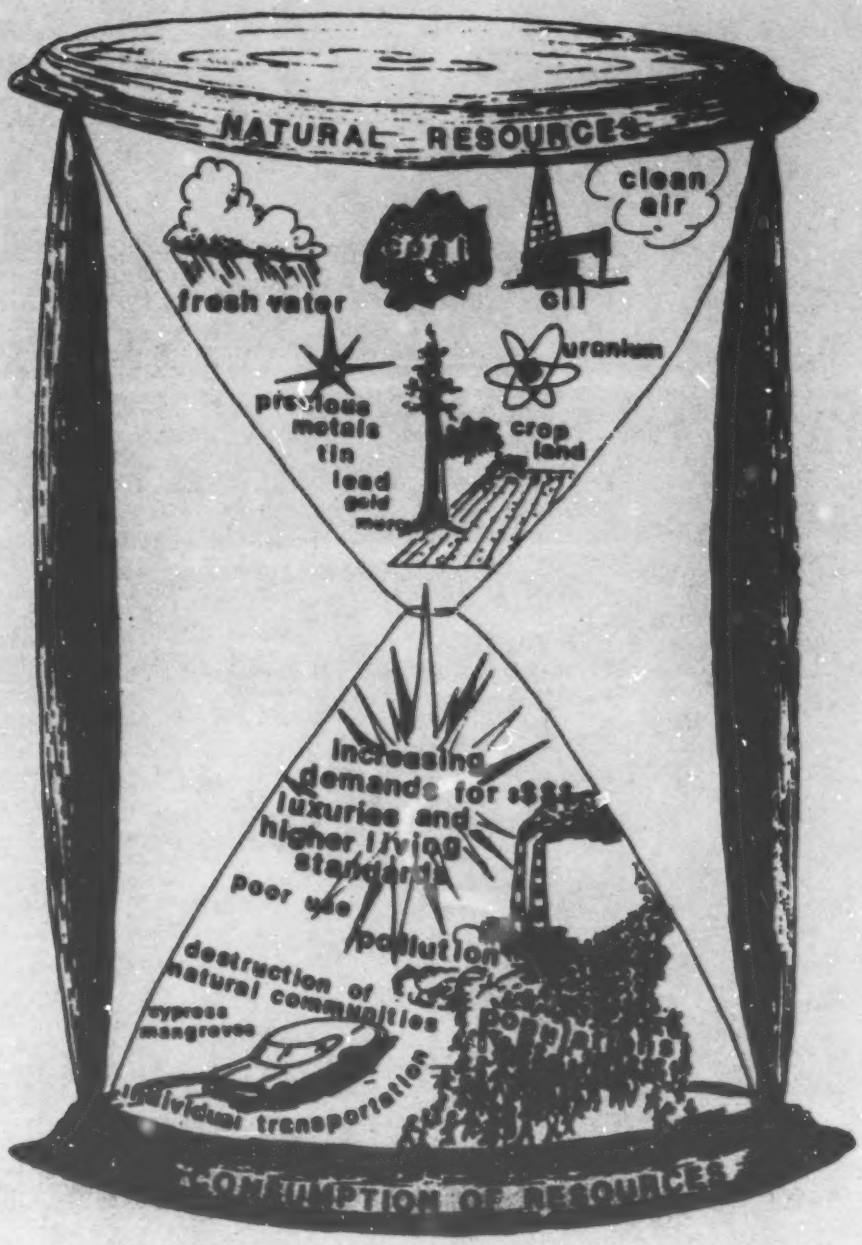
Activity 6

Tell the students they all own 5 feet of the beach. Have them write a paragraph on what they would do with it. Then tell them people are moving into the area and 2 feet of land will be taken away from their five.

Have them write a second paragraph expressing their feelings about this action. Next, one more foot is taken away from each student due to more babies being born in the beach community. In this last paragraph have them write what they would do about this last action.

CONCEPTUAL SCHEME V

We live in a world of finite resources and almost infinite demands on those resources.



Resources may become finite

(a) if there is only a limited supply, e.g. oil, and we consume it;
(b) if man misuses a renewable resource, e.g. air, water, forests, soil, estuaries, fish, so that it is totally changed by pollution or misuse and no longer can renew or recycle itself to be used again by man.

CONCEPTUAL SCHEME V

We live in a world of finite resources and almost infinite demands on those resources.

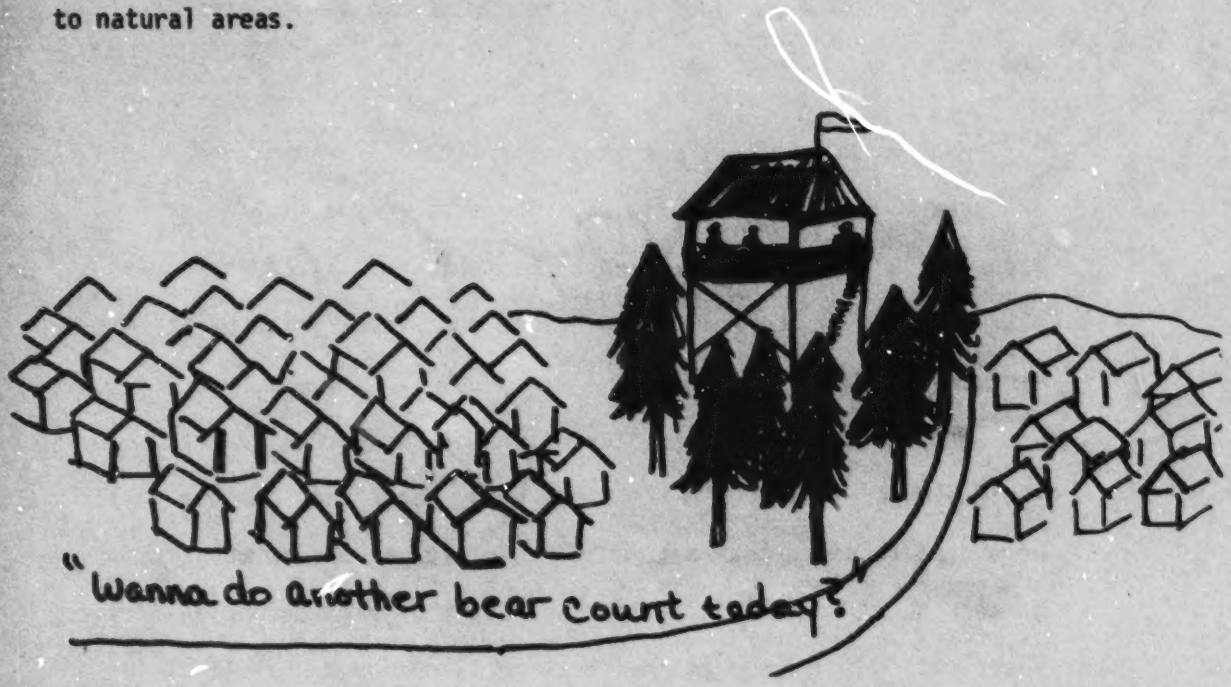
Many of our natural resources, particularly mineral resources and energy resources, are finite. There is only a limited amount; when they are gone they will never be replaced. In addition, man has made many of the world's renewable resources finite by his mismanagement of the resources.

Many of our resources which depend on cyclic patterns to replenish themselves have been altered by man. When man consumes more of a resource than nature is recycling, he upsets the cyclic pattern and produces a situation whereby the resource becomes finite. There will be a time when the resource is consumed and the cycle breaks down because it can no longer replenish itself.

We see this in many life cycles; from bacteria in our soil which convert nitrogen, carbon and sulfur to usable products, to our ever increasing endangered wildlife species and mineral and natural resources, e.g., timber and fisheries. These resources are being harvested or interfered with by man's technological needs.

Concept A

Increased pressures for land development will cause more and more stress to natural areas.



Activity 1

Take field trip on mangroves and development, if possible.

Activity 2

Use any or all of the following activities from Brennan's People and Their Environment, Social Studies 7-8-9.

Relate these activities to Florida.

Lesson 11, "Wilderness and Man", p. 19

Lesson 22, "Wildlife", p. 37

Lesson 24, "Wildlife Laws and Policies", p. 40

Lesson 29, "National Parks", p. 51 Discuss overcrowding in parks.

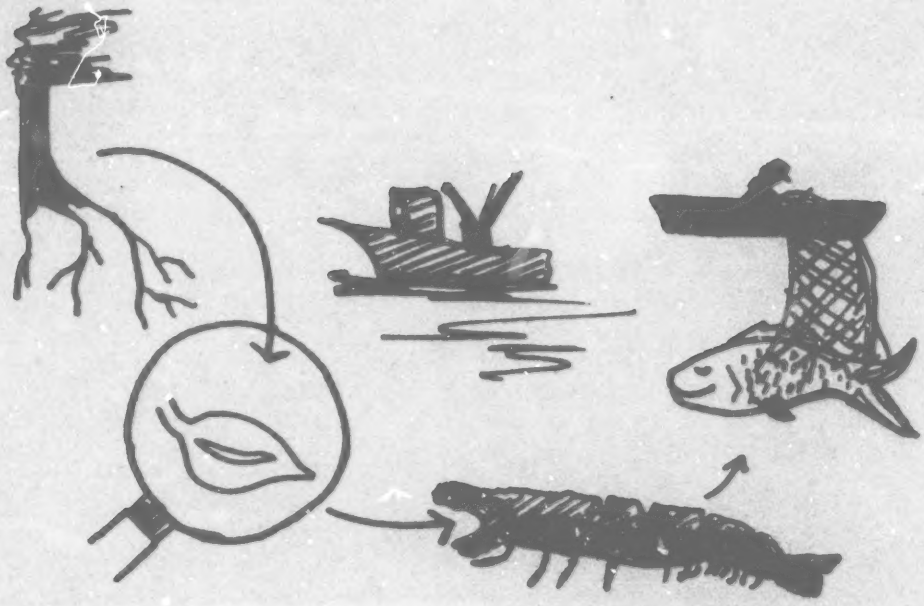
Lesson 30, "National Forests", p. 52 Discuss encroaching developments.

Activity 3

Show the film, "Salt Marsh" Pinellas County #574-2-051.

Concept B

Mangroves are a valuable natural resource.



See also Conceptual Scheme I, Concept A and Conceptual Scheme III, Concept B.

Activity 1

Take a field trip on mangroves and development, if possible.

Activity 2

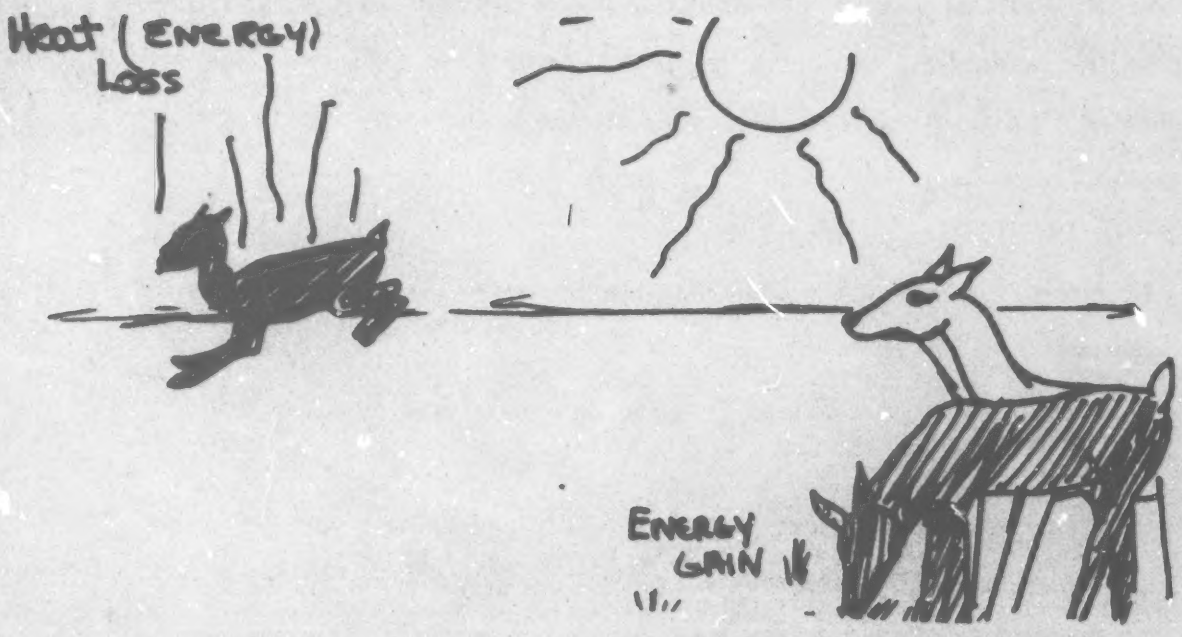
Have students observe on their own, the black and red mangroves located near and around a Causeway or Fort DeSoto Park. Tell them to sketch the mangroves, paying close attention to the roots. Go to the Library and research mangroves, find their purpose and usefulness in the environment. Write these facts under your drawings.

Activity 3

Show the film, "The Harmony of Nature and Man." Pinellas County #979-2-008.

Concept C

Life can only exist through a constant input of energy.



See also Conceptual Scheme I, Concept C.

Activity 1

Using the card catalog and the Reader's Guide to Periodical Literature, find information on malnutrition. Write a report on malnutrition emphasizing its causes and effects.

--Why is food necessary to the body? (Needed for growth, repair, and energy.)

--Could a person be undernourished even though he was getting enough calories every day? (Yes, if he is not getting the proper amounts and kinds of nutrients.)

--How does protein malnutrition affect developing children? (Proteins are needed for proper development of nerves and muscles.)

--How many of the people in the world are suffering from malnutrition? Is there enough protein available to satisfy the needs of all people? (No.)

Activity 2

Construct an energy pyramid showing the movement of energy from one trophic level to another. Point out that all producers get their energy from the sun and all consumers get their energy from producers. As energy is transferred from one level to another, energy is lost to the atmosphere as heat.

Assign these points to study:

--List the food products associated with the different levels of the pyramid.

--Is most of our food obtained from the upper or lower portions of the pyramid?

--What part of the food pyramid must be exploited to make more efficient use of the energy available?

--If the world population continues to increase, what parts of the energy pyramid might become unavailable? Why?

Activity 3

Use Lesson 6, "Energy For Life", from Brennan's People and Their Environment, Biology, p. 21.

Concept D

Since our petroleum and nuclear resources are finite, we will have to manage them wisely.

Activity 1

Demonstrate rising costs as resources diminish through the following activity. Relate the activity to the energy industry.

Purchase 4-32 ounce bottles of Coca-Cola and enough very small paper cups for your whole class. Chill the cokes and bring a shot glass to the classroom. Place the cokes on your desk (more enticing if you pack them in ice) and tell the students there is plenty of coke for each student to buy at least three shots. Indicate to the class that the student who buys the most shots will win the game and get an extra 5 shots of coke. Out of scrap paper have the students cut enough 1" squares so that each student will have ten wampum papers. Explain auctions and bidding to your students. When the bidding is over you will want to demonstrate how a free market economy relates to this kind of bidding situations. Have

the students bid on the coke one shot at a time. Even though you remind them that they aren't going to get very much coke if they bid the price up in the beginning, a few will probably do this anyway. On the blackboard record the price of each shot and who bought it. As soon as the first bottle of coke is gone remove two of the bottles of coke and explain to the kids that we really didn't have as much coke as we thought. Compare this to the oil industry. Now let the bidding continue on the second bottle. If they wish, small groups of students may give their wampum papers to other students. Typically, the bidding will begin a little high and then decrease through the rest of the first bottle. Bidding should climb during the second bottle and if you let students pool their money, the cost may be very high for the last few shots. Graph the bidding results. Carefully relate this price situation to the prices of our rapidly diminishing energy resources such as oil.

--Why does the price of an item go up as it becomes scarce? (Since the demand is high, people are willing to pay more for an item that is scarce.)

--How many years of oil reserves do we have left in the U.S.? (In 1973 we had about 9 years of identifiable reserves left.)

--What will happen to the price of gasoline, electricity, fuel oil and other oil products as the supply dwindles? (Prices will go up.) How much will people be willing to pay for the last few thousand gallons? (Hundreds maybe thousands of dollars.)

--What will happen to your standard of living as the cost of energy rises? (Go down. We won't be able to travel as much, we will have smaller cars, less air-conditioning, etc.)

--Do we waste our energy resources?

--Is it worthwhile to begin conserving our energy resources now so that we will have inexpensive energy longer?

Activity 2

Use Lesson 60, "Petroleum--Once Used, Gone Forever", Brennan's People and Their Environment, Science 7-8-9, p. 118. The lesson explains the uses of petroleum and stresses the importance of using it wisely. Students are asked to analyze the uses of petroleum; a discussion is held; an experiment is introduced; and all information is related to the individual, the community and the nation. After the lesson has been completed, inform the students that the U.S. has 9 years of petroleum reserves left (the Alaskan oil will only last two years) and that the world supply is down to 22 years. Remind them that many foreign countries are beginning to restrict our use of their oil. Have the students answer the following questions in a report that they will write on "How the Oil Shortage Will Affect Me."

--What is going to happen to the price of oil in the next 10 years?

--Is there anything that won't go up in price as we run low on petroleum? (Remember: Most electricity comes from petroleum and all transportation requires petroleum.)

--Do you think you will ever own a car? How will you afford to drive it?

--Will you be able to travel?

--Do you think man will find an energy substitute that will satisfy our insatiable demands for energy?

--What will this do to your standard of living?

--Do you think we should destroy mountain ranges to harvest oil from shale?

--Since there doesn't seem to be a substitute that will completely replace the energy we get from oil, what do you think we should do with the remaining oil?

Activity 3

Since electrical energy is closely tied to this concept, take a field trip to a power plant.

Activity 4

Show the film, "Solar Energy" Pinellas County #531-2-018.

Activity 5

Show the filmstrip, "Power Drain," available from the Science Supervisor, Largo C & I.

Concept E

Conservation responsibilities must be shared by individuals, businesses and industries, special interest groups, and all levels of the government.

Activity 1

As you discuss the following resources, have students describe what each of the groups listed in the concept can do to preserve the resources.

air	estuaries
water	glass
soil	plastics
oil	iron
trees	electricity
wildlife	space

Activity 2

Have students write down three ways that they spend money for consumable goods. Compile this into a comprehensive list to include as many different goods as possible. Then have the class take each item and determine the most pollution-free form of the item.

Example: can vs. returnables; cartons vs. returnables; bulk vs. individual wraps; frivolous packing vs. reasonable packing

Activity 3

Use any or all of the following activities from Brennan's People and Their Environment, Social Studies 7-8-9.

Lesson 1, "Introduction to Conservation", p. 5

Lesson 2, "Natural Resources (General)", p. 6

Lesson 4, "Water--Supply and Demand", p. 8

Lesson 9, "Mineral Resources", p. 15

Lesson 12, "Resource Use Affects the Nation's Economy", p. 20

Activity 4

Show the film, "Tomorrow's Children," Pinellas County #301-2-011.

Activity 5

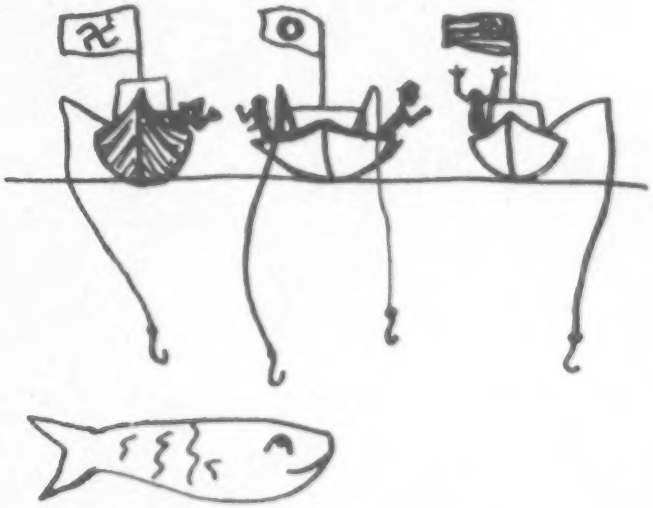
Show the film, "So Little Time," Pinellas County #598-1-025.

Activity 6

Show the filmstrip, "Recycling Resources," available from the Science Supervisor, Largo C & I.

Concept I

As the demand for our finite resources increases, there will be an increasing number of international conflicts over those resources.



Eenie, meenie,...

Activity 1

Read and discuss exerpts from chapters 15-19 in Wesley Marx's book, The Frail Ocean. These chapters cover international conflict over resources in great depth and are always eye openers for students.

Activity 2

Use Lesson 8, "Natural Resources in World Conflict", in Brennan's People and Their Environment, Social Studies 7-8-9, p. 14.

This lesson clearly shows that nations are in great conflict over resources so war frequently occurs.

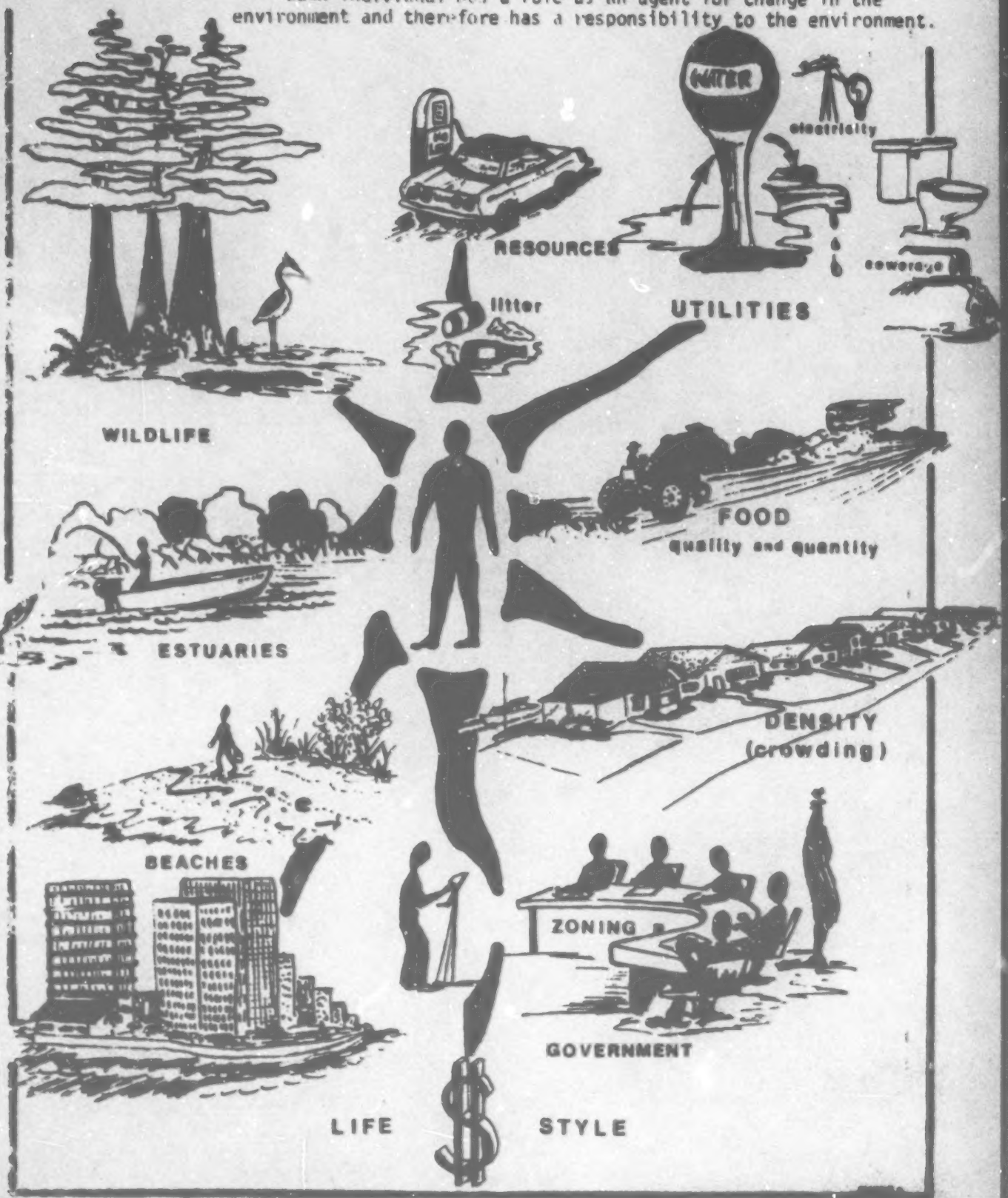
Activity 3

Use Lesson 72, "National Conflict and Resource Use", in Brennan's People and Their Environment, Grades 4-5-6, p. 145.

This lesson gives the student insight into resources and war.

CONCEPTUAL SCHEME VI

Each individual has a role as an agent for change in the environment and therefore has a responsibility to the environment.



CONCEPTUAL SCHEME VI

Each individual has a role as an agent for change in the environment and therefore has a responsibility to the environment.

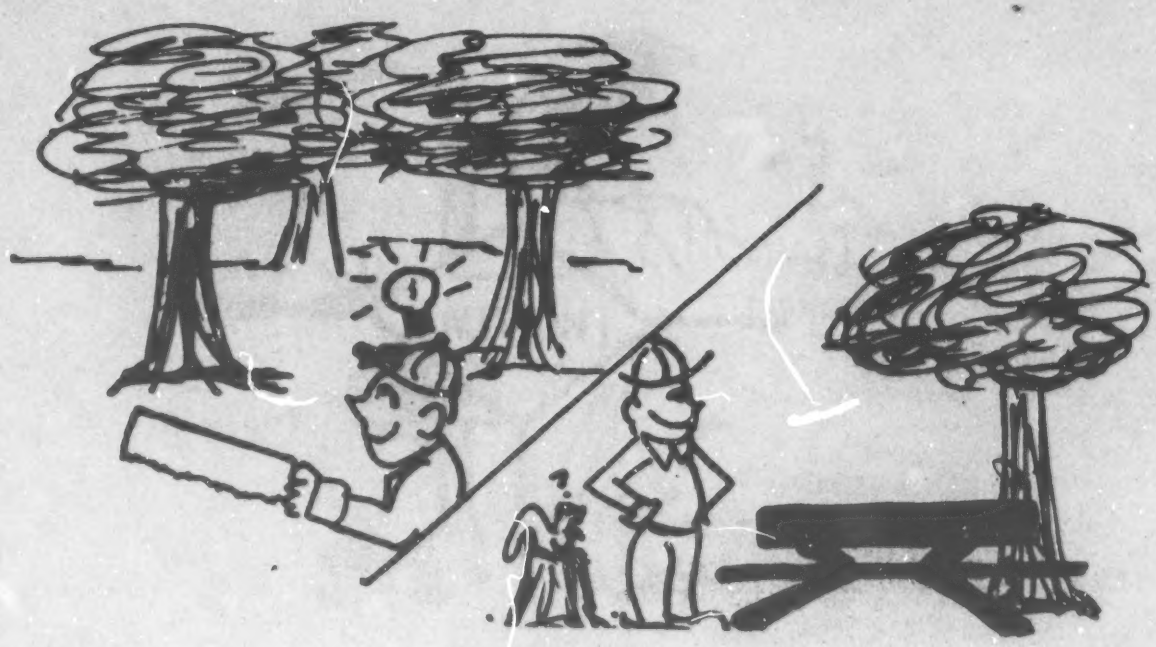
Each of us, by the nature of the way we live, has an effect on the entire area which we inhabit. We have a distinct effect on our physical environment, from the food we eat to the electricity and "toys" we require; clothes we wear; litter; garbage and sewage we produce.

The more we demand in the way of man-made products, services and comforts, the more our natural environments must be changed to accommodate us. In other words, we make trades continually. To use electricity, we must pollute our environment. To promote bigger cities and more people, we must change or destroy the natural landscape and its related ecological cycles. We must realize, however, most of our trades are irreversible and we cannot trade back for what we had before. For instance, a mangrove or cypress forest, which took millions of years to develop and upon which so many ecological interrelationships depend, cannot be reestablished once man has draglined or dredged and filled it for a housing development. It cannot, even in many generations of man, be returned to the productive swamp it once was. It is, for all practical purposes, gone forever.

We must become aware of how our trades affect us before we make them. Our purpose, therefore, is to create an environmental literacy through our society and each of us as individuals can begin to make knowledgeable environmental decisions.

Concept A

When an individual makes a purchase of a material good, he spends some of his environmental quality as well as his money.



Activity 1

Have each student keep a list of the goods and services that their family purchases during the next week. In class have the students analyze their lists and determine what environmental damage was done to produce each of the items that they listed. You will have to help them determine the damage to the environment for some of the items they purchased.

--Do any of the things your family purchased cause more damage than other items?

--Could you live without the more damaging items?

--When you buy something that has caused environmental damage to produce, is the damage your fault or the manufacturer's fault?

--Do you frequently have choices between items that will serve the same function?

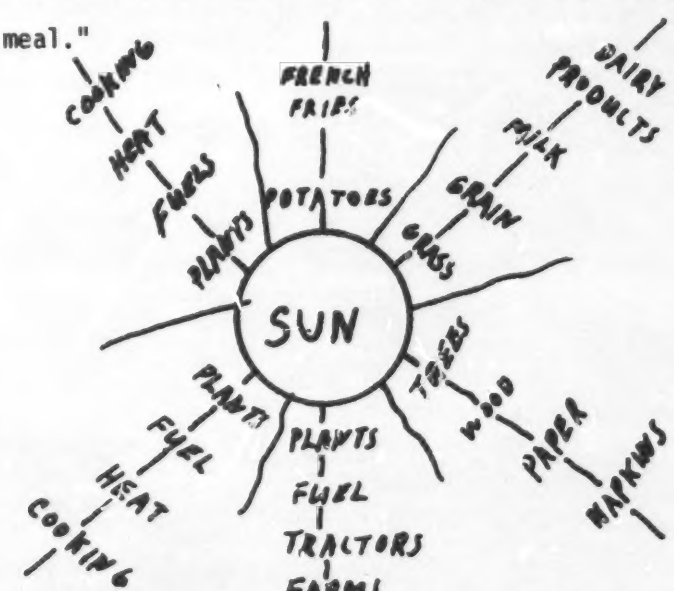
--Where one is less damaging than the other (returnable vs. non-returnable, big car vs. little car, etc.)? Which choice should you make?

Activity 2

Going to the woods for a picnic seems like a fine idea. Yet, with our bad habit of "disposable everything", we may find ourselves with no woods left because we've used them all up for our "paper picnics." It has been estimated that one of our hamburger giants in this country uses approximately 315 sq. mi. of forest per year for its wrappings alone! Have student construct a "non-disposable picnic" utilizing as many returnable items as possible. Perhaps this could be worked into a field trip lunch.

Activity 3

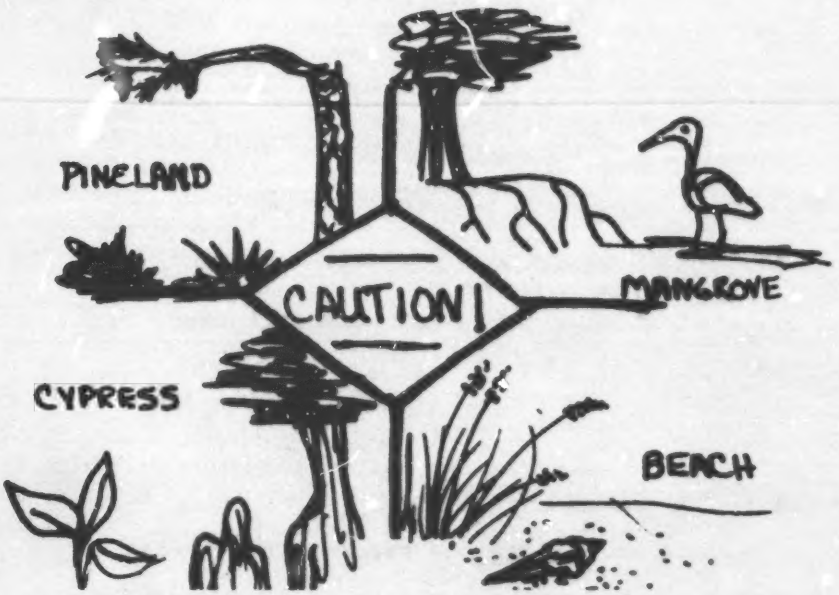
In the making of a hamburger, french fries and a milkshake, it is estimated that the energy content of the food is but 1/10 of the energy used to produce the meal. With respect to the sun, have students create an energy burst (sun burst) to show, from origin to presentation, our "all American meal."



--Is there anyway we could conserve on the amount of energy we use to make our meals?

Concept B

There are many unique habitats that should be saved (Everglades, Big Cypress, mangroves, etc.).



Activity 1

Go on a field trip to a "Mangrove" area near a causeway or to a County park.

Activity 2

Plan a field trip to the Sawgrass Lake Environmental Education Center. It contains the last stand of hard woods (Red Maple) in Pinellas County. Help students appreciate its beauty. Have a discussion as to why places like this should be saved.

Activity 3

Show the film, Celebration of Life: Trees Pinellas County #372-1-005.

Activity 4

Show the film, "Environment," Pinellas County #301-2-053.

Activity 5

Show the film, "The Harmony of Nature and Man," Pinellas County #979-2-008.

Concept C

To actively work to save the environment an individual must understand local, state and national politics. (Have students write letters to Congressmen, Senators, etc.)

Activity 1

Have the class pick a conservation issue that they are really interested in. Try to determine through all levels of government and public education exactly what it would take to solve that problem. Help the students avoid the pitfalls of being too simplistic.

Activity 2

Small groups of students should attend a local session of the City Council or County Commission over a period of time. They should write reports of each meeting and discuss them with the class or publish them in the school newspaper.

Activity 3

Write a letter to a Congressman, to a Senator and to a U.S. Senator and a U.S. Congressman. Ask them to send information to you regarding their

specific level of government.

Activity 4

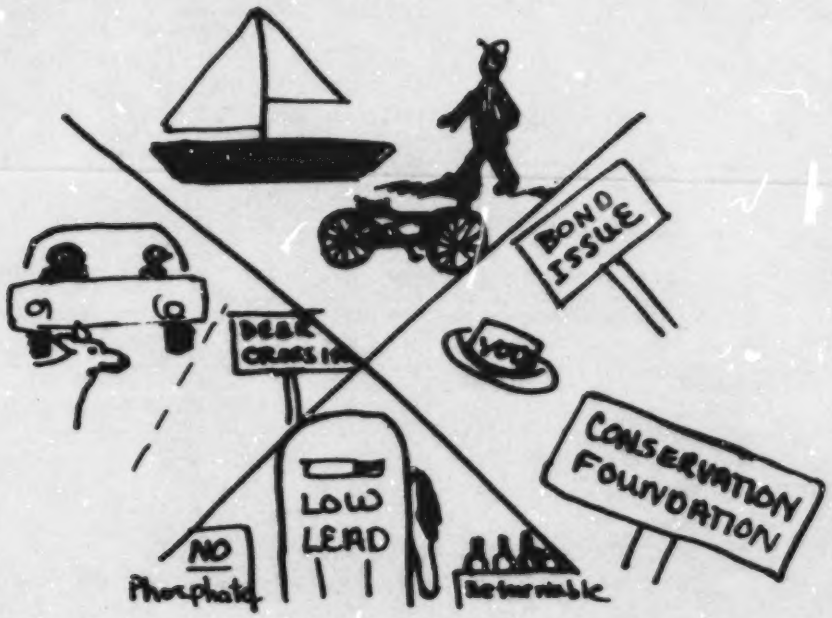
Use the following lessons from Brennan's People and Their Environment, Social Studies 10-12.

Lesson 28, "Legislation for Conservation", p. 46

Lesson 29, "Leaders for Conservation", p. 49

Concept D

An individual can do many things to help preserve the environment.



See also Conceptual Scheme VI, Concept A.

Activity 1 - Show filmstrip/tapes

1. Environmental Crisis

   "The Polluted Planet"

2. "Recycling Resources"

These filmstrips are available from the Science Supervisor, Largo C & I. Make a list of items students could do to individually affect the environment. Some suggestions geared to the middle school age are:

1. Save water.
2. Turn lights out.
3. Walk or bicycle more often.
4. Buy beverages in returnable containers.

5. Pick up more than just your own litter.

6. Use both sides of paper.

7. Decline excess packaging.

8. Set airconditioner higher.

9. Don't molest wildlife.

10. Don't plan toward large families.

11. Be conscious of neighborhood animals, especially if they begin to diminish.

12. Be aware of conservation agencies in your area.

13. Form/join awareness groups

    a) Audubon
    b) National Wildlife Federation
    c) Conservation
    d) Sierra Club

--Ask students to list two specific steps their household could easily do to ease environmental degradation.

Activity 2

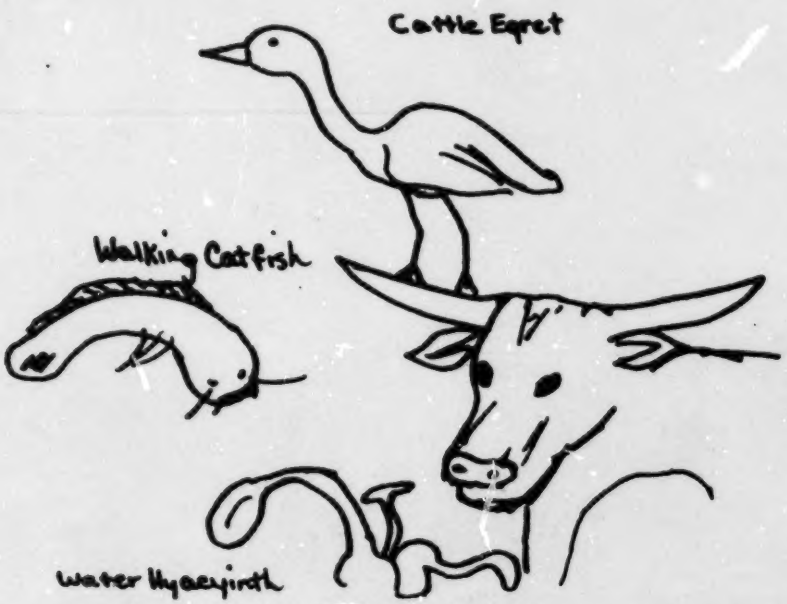
In the form of cartoons, have the students draw a series of pictures showing a man in the midst of doing something worthwhile to save some aspect of his environment. Each student should draw at least ten different ideas.

Activity 3

Have students list all of the things that they, as individuals, <u>can</u> do to help conserve our environment. After they have completed the list, have them go back and check those things that they aren't doing. When they have completed this, have them write a sentence for each check, explaining why they aren't doing the thing they checked.

Concept E

Introductions of exotic animals and plants are generally unwise. If they are successful, they often displace native organisms and become pests.



See also Conceptual Scheme II, Concept F.

Activity 1

Many foreign plants and animals that are introduced into Florida begin growing out of control in our favorable climate. This usually occurs because the diseases and other controls that were present in their native country are no longer present in their new environment. The following list will provide you with a little background on these exotic plants.

1. Melaleuca (Punk trees) This tree is a native of Australia and was apparently introduced into Florida first by the people at Koreshan. The tree grew well in Florida, so a forester, who thought the tree would be a good source of pulp for paper, spread seeds over the southern part of Florida from an airplane. The tree is now a major problem in central and south

Florida as it is presently displacing much of the native vegetation. Since most of our animals are adapted to our native vegetation, they don't live in the melaleuca.

2. Water Hyacinth This species was originally imported because of its beautiful flowers. It now chokes many of our rivers and lakes, thereby displacing native vegetation and animals.
3. Brazilian Pepper This species was also introduced and is rapidly becoming a pest. The stands grow so thick a man cannot walk through them. Birds do feed on the berries but they obliterate all native vegetation.
4. Walking Catfish Aquarists first imported this species from southeast Asia. When they become established in a pond they consume most of the native species of fish that man commonly fishes for. They are a triple threat because they can cross land by walking on their fins.

These are but a few examples of exotic species. Discuss these with the class.

--Can you think of other exotic species? Others that have become pests?

--Do you think that Florida will ever be completely covered with exotic plants? (Some of our foremost ecologists think that that might happen.)

--A television station in Tampa advertised kits containing California Moth and Butterfly larvae. These were meant to be educational toys. Do you think this is a good idea?

--How can we eradicate those exotic species that become pests? What would this do to native vegetation?

--Discuss laws that might solve these problems.

--Should you plant exotic species in your yard?

MATERIALS BIBLIOGRAPHY

BOOKS

People and Their Environment - Teacher's Curriculum Guide to Conservation Education. Matthew J. Brennan (Ed.), J. G. Ferguson Publishing Company, Chicago, Ill.

NOTE: Each teacher should have his grade level guide. Check with your Principal or Librarian.

Biology, Science 7-8-9, Grades 4-5-6, Grades 1-2-3, Social Studies 7-8-9, Social Studies 10-11-12, Home Economics, Outdoor Laboratory are all separate editions located in your library.

Reflections On A Gift Of Watermelon Pickle and Other Modern Verse. Stephan Dunning (Ed.), Lothrop, Lee & Shepard Co., Division of William Morrow & Co., Inc., 105 Madison Avenue, New York, N.Y. 10016. 1967.

COUNTY FILMS	TIME	COUNTY #
American Bald Eagle	16	598-2-015
Adaptions to Ocean Environments	13	574-2-035
Air Pollution	8	628-1-005
Birth of a Florida Key	14	917-2-017
Celebration of Life: Trees	8	372-1-005
Electricity: How it is Generated	11	621-1-004
Environment	29	301-2-053
Evolution	11	574-1-021
Food from the Sun	10	523-1-007
Nature's Half Acre	33	591-2-017
Salt Marsh	22	574-2-051
Solar Energy	21	531-2-018
So Little Time	11	598-1-025
Strand Breaks	15	333-2-006
Succession - From Sand Dune to Forest	16	574-2-029
The Harmony of Nature and Man	12	979-2-008
The Rise and Fall of the Great Lakes	16	977-2-002
Tomorrow's Children	17	301-2-011
Water Coming and Going	20	551-2-031
Water Pollution	13	628-2-006

FREE FILMS - COLOR

Shell Oil Co.:

Air is for Breathing	29 min.
Food or Famine	28 min.
Living Soil	20 min.
Pesticides in Focus	25 min.
The Rival World	27 min.
The River Must Live	21 min.

FILMSTRIPS - w/CASSETTES

SCIENCE SUPERVISOR - LARGO C & I

Animal Behavior - National Geographic
Exploring Ecology - National Geographic
Exploring Your Environmental Choices, Transparencies
Extinct, Endangered and Threatened (6 f.s.-cassettes)
Life Cycle - National Geographic
Overpopulation - SVE
People in Poverty - SVE
Recycling Resources
Small Worlds of Life - National Geographic
The Polluted Planet - Sve
The Power Drain - Sve
There's No Place Like Home - Scott
World of Endangered Wildlife - National Geographic

GAMES

SCIENCE SUPERVISOR - LARGO C & I

Dirty Water - Urban Systems
Ecology - Urban Systems
Population - Urban Systems
Smog - Urban Systems
The Planet Management Game - Houghton Mifflin
The Pollution Game - Houghton Mifflin
The Redwood Controversy - Houghton Mifflin